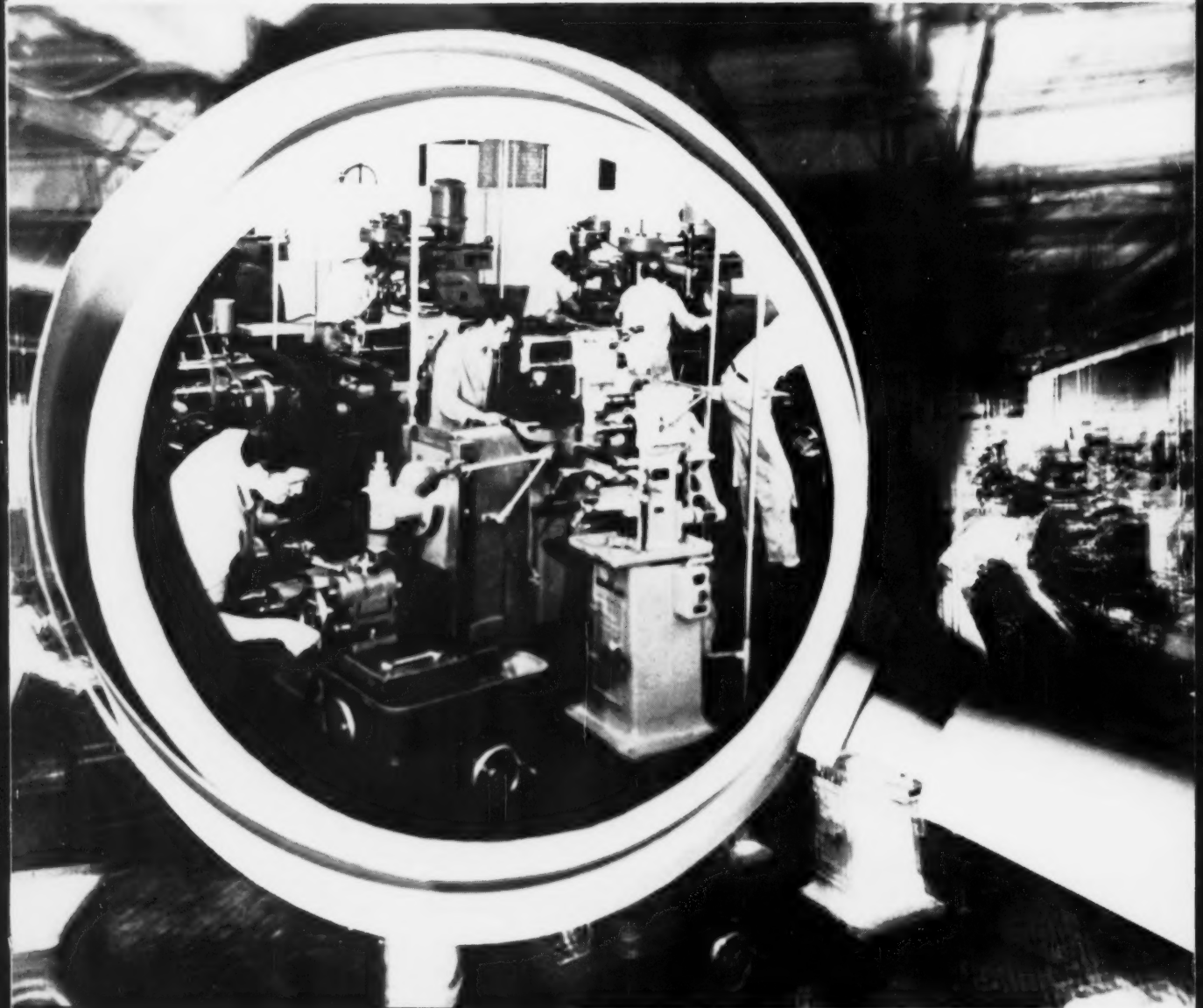


The IRON AGE

March 28, 1957

The National Metalworking Weekly



Special Survey Report

**To Cut Costs: Take
A Close Look At
Scrap Control P. 81**

**How Steel Firms
Rate in '56 Earnings — P. 78**

**New Ideas
In Swaging Techniques — P. 111**

Digest of the Week P. 2-3

THE MEN BEHIND THE METAL



The making of quality leaded alloy electric furnace steels is a highly scientific job. The planning, the constant study, the checking of minute details by skilled metallurgists, that go into the creation of one billet of leaded steel, represent one of the highest forms of industrial craftsmanship. At Copperweld, manufacturer of the most diversified line of lead treated and carbon steels, a staff of skilled metallurgists is constantly at work to insure Copperweld's leadership in the production of hot rolled blooms, bars and billets.



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It's the type of care that begins at the furnaces, where the steel is made, and is evident in all the successive steps of rolling, forging, heat-treating, cleaning, and inspection. And throughout the entire process our metallurgical watchdogs are always

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Bethlehem offers a thoroughly integrated set-up, one that produces a huge variety of drop-forge designs. Every aspect of the service is strictly first-class. If care and alertness are extras that you value, it will be to your advantage to call us.

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IRON AGE

The

Mar. 28, 1957—Vol. 179, No. 13

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*Starred items are digested at right

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NEWS DEVELOPMENTS

Shipbuilding Rides Crest Of Building Wave

Present and foreseeable business
will keep shipyards busy for years.



A \$3 billion dry-cargo program,
for instance, will build 300 new
ships by 1964. It couldn't be done
without government subsidy. P. 67

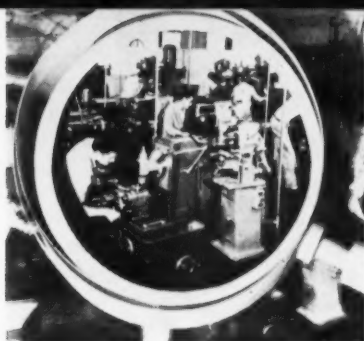
Wire Fabric Makers Gamble On Bigger Demand

An industry that has doubled in
the last 5 years will bring in 75,-
000 more tons of capacity in 1957.
Leaders express confidence in de-
mand from three major markets,
expect roadbuilders to up buying
the most. P. 71

Scrap Exporters Are In For a Long Wait

When the Commerce Dept.
suspended licensing for export of
heavy melting scrap last Feb. 19,
it was thought the restriction would
last about 30 days. Now it looks
like another three-week delay. Pro-
tests grow louder. P. 72

Metalworking



SCRAP CONTROL: Like this magnified view of a Daco Instrument Co. milling machine shop, today's survey report will help you take a closer look at your quality control setup. It offers pointers for building a workable in-plant scrap charging system. **P. 81**

1956 Was One of Steel's Best Years

In spite of a month-long strike, steel had a top year in '56. But climbing costs, both of labor and materials, plus an unrealistic depreciation picture, left something to be desired. Steelmen have a few misgivings about '57. **P. 78**

FEATURE ARTICLES

Modern Swaging Packs Production Surprises

Production men are finding rotary, other swaging tools quite versatile in manufacturing, assembly. Sample jobs: Transforming non-ductile, aluminum-lead alloys into putty-like material suitable for cold-working; transferring outside contours to the inside of thick-walled sections. **P. 111**

Get More Protection From Galvanizing

Galvanizing's worthless against corrosion if the zinc coating cracks and peels in forming. Studies into different coating structures suggest ways of making the thicker zinc coatings better. Metallographic studies show what happens and how in coating. **P. 115**

You Can Weld Structural Without Distortion

As construction people call for bigger structural weldments, distortion headaches go up. Submerged arc welding with two electrodes is one answer. **P. 118**

How Tight Is Tight With Bolts?

How much do you tighten nuts and bolts? Stress classification, materials joined, thread surface friction—a number of variables figure in. Understand these first, then let a relatively simple formula approximate a required torque from them. **P. 120**

Continuous Heat Treat Ups Output

Combining hardening and tempering operations into a single-line setup saves up to 30 pct for this manufacturer. Capacity's 400 lb per hour, up 150 lb. Temperatures run to 1700°F. **P. 122**

MARKETS & PRICES

Big New Market Grows In Outboard Motors

Metalworkers can envy the outboard motor market. It has nothing ahead but growth in unit and dollar volume. Once a small market, it now bears looking into for producers of metal parts. **P. 70**

Chevrolet Experiments With A Super Sport

The Super Sport, a Corvette that is 1000 lb lighter than its prototype, is being used by Chevrolet Div. to test lighter metals. It may bring about economies in passenger car operation. **P. 89**

Federal Defense Budget Will Stand Pat

Congress will talk plenty, but there are no big cuts in the cards for the money requested for military spending. Politicians don't believe the king size budget will have political repercussions. **P. 95**

Farwestern Planemakers Want Parts Suppliers

Both aircraft and missile builders in that area are on the prowl for new sources of supply. They spend billions every years, much of it in other areas. **P. 97**

Steel Production Heads For April Low

Slack demand for sheets and other products will depress the steel operating rate still further in April. But there are signs of a pickup. **P. 145**

NEXT WEEK

How To Do Business With The Government

Landing a government contract doesn't mean going through a mountain of red tape. In next week's issue, H. Struve Hensel, former Defense Dept. official, gives advice on dealing with the U. S.

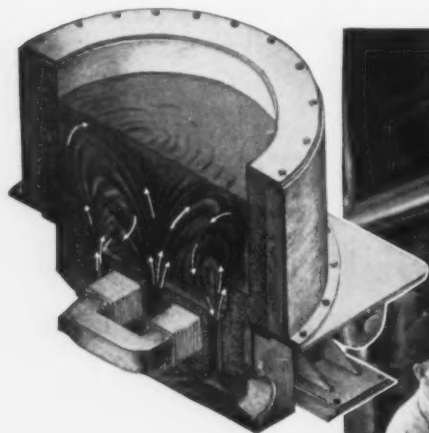


Hard-To-Melt Bronzes Successfully Handled

In

AJAX INDUCTION FURNACES

Brass and bronze foundries all over the country have found AJAX-TAMA-WYATT induction furnaces a reliable tool for melting silicon bronzes, aluminum bronzes, leaded bronzes, phosphor bronzes, and other high strength alloys. Operation is highly economical due to the good uniformity of the alloys, low ratio of rejects, drastic reduction of metal losses, and clean operating conditions. This recent development opens the field for the use of AJAX induction furnaces in all foundries where difficult-to-melt alloys are handled.



Cross section of AJAX-TAMA-WYATT twin coil induction furnace such as used at the Torrance Brass Foundry. Heat is produced within the molten metal in the secondary channels and conveyed throughout the melt by electromagnetic circulation, resulting in minimum metal losses and high uniformity of alloy. Temperature is automatically controlled.



(Photograph courtesy of Long Beach Press-Telegram, Long Beach, Cal.)

The furnace pictured here is melting aluminum bronze at the Torrance Brass Foundry, Torrance, Cal., operating at a temperature of 2400 F, for the production of high strength centrifugal castings.

This unit is rated 100 kw. Note also the clean, smokeless operation as shown in the unretouched photograph.



LINE FREQUENCY
INDUCTION MELTING FURNACES
AJAX ENGINEERING CORP.
TRENTON 7, NEW JERSEY

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Ajax Electric Company

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Armco ALUMINIZED STEEL

...Resists Combined Attack of Heat and Corrosion

...Directs and Saves Heat

Truck mufflers made of ALUMINIZED STEEL increased service life five times

Here's a typical example of the extra product life offered by Armco ALUMINIZED STEEL® Type 1 . . . the special steel that withstands destructive combinations of heat and corrosion:

A major truck fleet in Nashville, Tennessee, reports five times longer service life for mufflers made of ALUMINIZED STEEL than for carbon steel mufflers previously used.

Many products besides mufflers have also been improved by this special steel. Parts of heaters, furnaces, stoves and ranges—serving where heat and corrosive gases make short work of plain carbon steels—last longer when they're made of Armco ALUMINIZED STEEL Type 1.



◀ Reflects radiant heat, too

The inner body of this rotisserie is made of Armco ALUMINIZED STEEL Type 1 because, up to 900 F, this aluminum-coated steel reflects about 80 per cent of the radiant heat that meets it. Many manufacturers design appliances to take advantage of this reflectivity as well as the high strength of ALUMINIZED STEEL. Depending on requirements, it may be used to hold heat in, or to direct heat where it's wanted.

If your products must resist combinations of heat and corrosion, or reflect heat efficiently, it will pay you to consider Armco ALUMINIZED STEEL Type 1. Call our nearest sales office or write us for full information at the address below.

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The "Bygone" Era

How Far Gone Is It?

Some people say Treasury Secretary George Humphrey represents a bygone era. They argue that his economic baggage hasn't that modern look.

He has become a symbol for two major groups of people. He means backwardness to those who want to spend themselves—and others—into economic perdition. To those who believe in reasonable spending, in savings and in paying one's own way, Mr. Humphrey has become a shining symbol of hope.

What does this bygone era stand for? For one thing, it means we should not sponge on others to get what we want or need. It assumes we will use common sense in living our economic life.

It argues that since government is composed of all people, it can be no better than its parts. Our government can't control its appetite for pie in the sky if we can't do likewise.

The bygone era taught us that hard work earns its reward; that slovenliness and laziness should get far less than an even break. It suggests that a modern dole is no less a dole even if called something else.

Mr. Humphrey symbolizes an attitude based on integrity, discipline and patriotism. When such

beliefs are coldly "analyzed" those parts that spring from the heart have a tendency to get lost. And we do think best with our hearts.

The bygone era taught us that moderation is its own reward; that thinking of the other person should be a natural rule of life. Or to say it another way: to act with restraint and courage now means less tears and hardship later.

Perhaps the man on the street—who applauds Mr. Humphrey—is away ahead of Washington. He usually is.

No one in his right mind wants proper spending to be cut. But most people now want a hand painted picture of what is and what isn't "proper" when money is being tossed around.

Grass roots people know a bargain when they see one—they always have. They don't see one in our national spending and they are questioning our so-called "security." They do want defense and necessary government projects. But they want to be sure that's what the spending covers.

The so-called bygone era is not so far gone. It is back with spirit. Its supporters say you can't spend yourself and your children into everlasting plenty. And they're right!



Editor-in-Chief

BUNKER HILL



**The Zinc that originally put
Zinc-Base Die-Castings on a
High Level...and has kept
them high!**

BUNKER HILL ZINC, when its 99.99+ quality came into the market back in 1928, quickly proved to be a boon to the die-casting industry. It enabled die-casters to take full advantage of the inherent merits of zinc-base castings. Bunker Hill pioneered this basic change in the development of the industry. It is still a leader in the production of quality zinc for die-castings.

Today, the die-caster who wants the best is able to get the purest zinc available—Bunker Hill. If you would be interested in trying out Bunker Hill, let us know your requirements. We'll put you in touch with a small tonnage supplier.



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LETTERS FROM READERS

SAE Presidents

Sir—Thanks very much for the tearsheet of the Salute to me in your March 7 issue. It makes me feel very proud to be recognized in this way by your fine publication.

There is one slight error, which as of now is probably not important. Mr. Henry Souther, who was President of SAE in 1911, was I believe, primarily a metallurgist. As far as I know Mr. Souther was the only previous SAE President connected in any way with metallurgy. Also, there has been no other SAE President from New England since 1911. **W. Paul Eddy, President, Society of Automotive Engineers, Inc., New York, N. Y.**

Packaging

Sir—On p. 49 of the Feb. 21 issue of your magazine contained a brief article entitled "Strip Packaging Costs Down." If possible, we would appreciate receiving more information about this new method of reducing strip packaging costs. **M. Kosten, Mgr., Production Metals and Basic Materials Dept., Ford Motor Co., Dearborn, Mich.**

Write to Signode Steel Strapping Co., 2606 N. Western Ave., Chicago 47, Ill.—Ed.

The Search

Sir—I would like to obtain two copies of "How to Get More For Your Aluminum Dollar" which appeared in the Jan. 31 issue, if there are any still available.

This article is exemplary of the fine service which you are rendering to metallurgical departments. The information contained has been available heretofore only by searching through a fairly large number of references. **T. E. Hack, Senior Metallurgist, Jack & Heintz, Inc., Cleveland, Ohio.**

Copies are on the way.—Ed.

Adhesives

Sir—In the Feb. 7 issue mention is made of a non-mix epoxy adhesive product. Will you please advise the name of the company who could supply us with literature pertaining to this product? **J. R. Warda, Engineering Technical Library, Kearney & Trecker Corp., Milwaukee, Wis.**

For more information write the Rubber & Asbestos Corp., 225 Belleville Ave., Bloomfield, N. J.—Ed.

Chroming

Sir—In your Mar. 7 copy of THE IRON AGE we note in the "Iron Age Newsfront" an item "Chroming Doubles File Life."

Would you give us any further information you may have such as manufacturer or distributor of the item referred to in this write-up. **E. M. Steenburgh, Heller Tool Co., Newcomerstown, Ohio.**

See article "Chrome-Coated Bench Tools Last Longer," p. 132, March 14 issue.—Ed.



"What a rough night! I dreamed I was spending my own money."

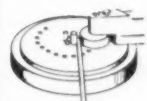
HOW TO BEND BARS and TUBING



HOW TO BEND... OFF CENTER EYES

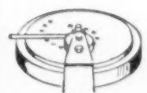
1

Insert bar stock between Locking Pin and Radius Pin of desired size.



2

Set Forming Roller against material and advance Operating Arm.



3

Complete operation with one steady movement.

HOW TO BEND... TUBING



1

Clamp tube. Insert Follow Block between material and Forming Roller.



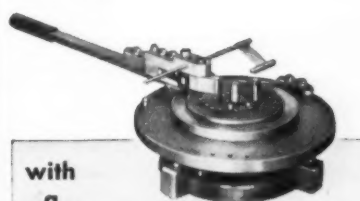
2

Advance Operating Arm until it strikes Angle Stop.



3

Remove Follow Block, release clamp and remove tube.



with a

DI-ACRO BENDER

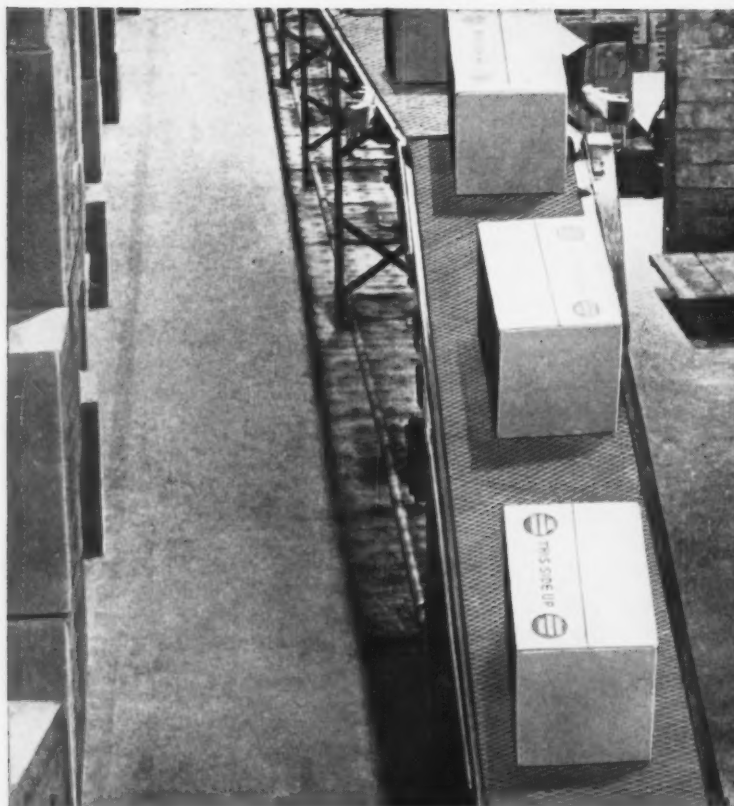
Complete details on forming rods and tubing with standard accessories as well as tips and technical data on angle, channel and other materials will be found in "It's Easy to Bend", a 32 page summary of Di-Acro Benders and bending. A copy is yours free of charge.

Consult the yellow pages of your phone book for the name of your nearest Di-Acro distributor or write:

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302 8th Ave., Lake City, Minn.



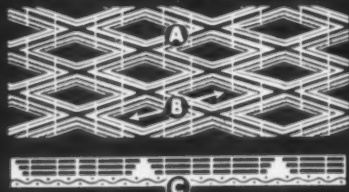


GOODYEAR INDUSTRIAL PRODUCTS



-Specified

Wedge-Grip Package Conveyor Belting



- A** Soft, long-wearing cover in stepped-down, diamond-shaped design provides long-lasting, superior gripping of smoothest package
- B** Siping — cross-cuts in cover design — improves grip and flexibility
- C** Cross section of belt showing "step-down" design of gripping ridges and fabric reinforcement

New way to save money without a slip

There's never been anything like this new Wedge-Grip Package Conveyor Belting! It can move almost anything—boxes, bags, cases, cans or what have you. And it can carry them up the startlingly steep inclines without delay-causing slippage.

Credit belongs to the new Wedge-Grip cover design — of unmatched gripping power. Special gripping ridges—in a unique diamond-shaped pattern—hold even the smoothest packages firmly. Their unusual "step-down" design means that whenever a ridge wears off, there's another there to do its job. And this belt sheds clogging dirt and debris as it moves.

What's more, that's only the surface design. A special rubber cover compound was also developed — just for this belting. It's soft for even greater gripping power—yet highly abrasion-resistant. It defies the normal hardening effects of age. It does not mildew. And it won't mark the packages it handles.

But get the whole moneysaving Wedge-Grip story from your G.T.M.—Goodyear Technical Man. He'll be glad to tell you about the complete line of Goodyear package conveyor belts. Just contact him through your Goodyear Distributor—or write Goodyear, Industrial Products Div., Akron 16, Ohio.

WEDGE-GRIP CONVEYOR BELTING by

GOOD YEAR

THE GREATEST NAME IN RUBBER

Wedge Grip—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

IT'S SMART TO DO BUSINESS with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."

FATIGUE CRACKS

Quality Control

How is your scrap rate? Has it got you in the dumps? Or does it just leave you with a nagging feeling that somehow or other it should be lower than it is? Either way, we think we can help you out.

This week's Survey Report to Management feature on quality control deals with this very subject. From the survey you'll be able to compare your inspection practices with those of a representative group of other metalworking plants. Not only that but you can find out the number of people assigned to inspection according to plant size, where the inspection department fits into the overall organization, etc.

How to Cut Losses—But you'll learn more than just statistics. One of the main parts of the quality control feature tells you how to set up an effective scrap control program. It can be applied to plants of any size. An important point—the article is more concerned with methods of preventing scrap losses than pinpointing the responsibility for rejects. It starts on p. 111.

Financial Analysis

Has the boss ever called you in to ask the net earnings of U. S. Steel Corp. in 1956? Or maybe the working capital of Jones & Laughlin or National Steel Corp.?

It would be nice, wouldn't it, to have this and other financial and

operational information about the major steel companies.

Well, that's why you'll find a copy of **THE IRON AGE** Annual Financial Analysis in a convenient corner of hundreds of metalworkers' desks. It's been a handy source of reference over the years—and from year-to-year.

This year's analysis can be found tucked away opposite p. 80, with a special interpretive story on how the steel companies fared on p. 78. As usual, it contains a gold mine of useful information.

New Puzzler

A man was expecting a very important letter which did not arrive. He was suddenly called to England and admonished his wife to forward the letter to him in London immediately upon its arrival. After three weeks, his business done, he was ready to return home but did not dare to leave for fear that the letter he had expected in New York would cross him. So he cabled his wife, "Have not yet received the letter. Where is it? The wife cabled back, "You took the key to the mail box with you."

The man, frantic because of the waste of time and exasperated with himself for being so stupid, enclosed the key in an envelope and sent it back to his wife, telling her he would wait for the letter. Several weeks passed and still no letter.

Why did it not arrive?

**IF YOU CAN KEEP YOUR HEAD
WHILE OTHERS ARE LOSING THEIR
MAYBE YOU DON'T UNDERSTAND
THE SITUATION**

WACKY MOTTOES: As we promised earlier, here is the latest in our wacky motto craze. Thanks to Abrasives Div. Elgin National Watch Co.

How Alcoa Aluminum Fasteners make good awnings even better



Alcoa® Aluminum Fasteners guard your reputation for quality aluminum awnings. They insure against both galvanic and atmospheric corrosion. They provide perfect color match and lasting good looks. Specify Alcoa Fasteners for assembly and installation. Your local Alcoa distributor carries complete stocks for every requirement. He is listed in the Yellow Pages of your telephone directory.



THE ALCOA HOUR
TELEVISION'S FINEST LITE DRAMA
ALTERNATE SUNDAY EVENINGS



Your Guide
to the Best in
Aluminum Value

Fill out coupon for facts, samples

Aluminum Company of America
2243-C Alcoa Bldg., Pittsburgh 19, Pa.

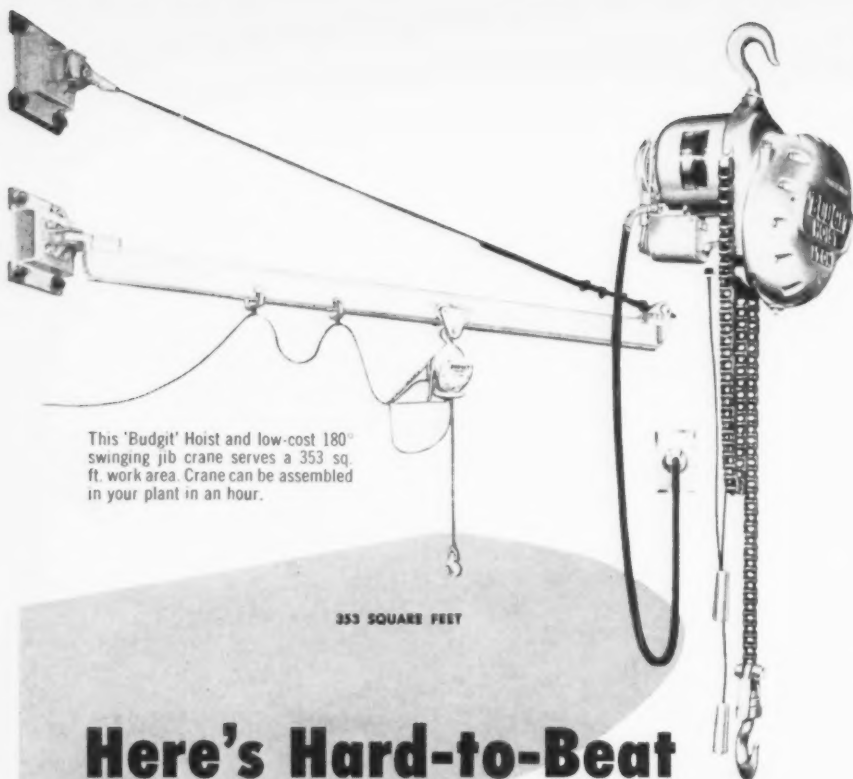
Gentlemen:
Please send complete specification data
and samples of Alcoa Aluminum Fasteners.

Name _____

Title _____

Company _____

Address _____



This 'Budgit' Hoist and low-cost 180° swinging jib crane serves a 353 sq. ft. work area. Crane can be assembled in your plant in an hour.

353 SQUARE FEET

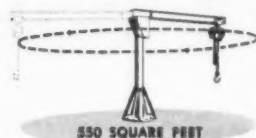
Here's Hard-to-Beat Load Handling For You!

IT'S ECONOMICAL. The 'Budgit' Hoist is the most widely used electric hoist in the world. It's simple, efficient mechanism and powerful motor provide fast lifting action. A ¼-ton load can be raised a foot in less than two seconds. Capacities range from ⅛ to 2 tons. A few cents pays for the electricity to operate any 'Budgit' all day.

IT'S ADAPTABLE. Used alone, the 'Budgit' Hoist can serve a work area of 19½ sq. ft. To multiply the operational range of any 'Budgit' many times, we can supply a variety of low-cost jib and bridge crane assemblies. With any one of them every shop or factory can have efficient, easily-installed crane service that makes a single hoist do the work of several.

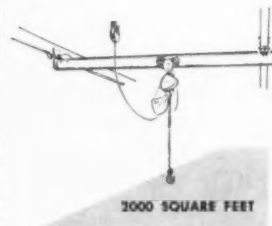
IT'S SAFE. To protect the operator, the load and the hoist itself, the 'Budgit' has automatic upper and lower safety stops; one hand control; two instant-action brakes, each alone powerful enough to hold the load; fracture-proof hooks; enclosed wiring — and many more.

Your "Shaw-Box" Distributor can give you full details on 'Budgit' Hoists and crane equipment . . . or write us for Bulletin 406.



550 SQUARE FEET

A 'Budgit' Hoist on full-revolving, self-supporting 'Load Lifter' Jib Crane can serve a 550 sq. ft. area. Excellent on shipping platforms, at machine tools, in foundry molding bays. Crane bolts to floor; rotates on ball bearings.



2000 SQUARE FEET

Used with a No. 62 'Budgit' Bridge Crane Assembly, a 'Budgit' Hoist can serve a 2,000 sq. ft. area. Crane comes in a "package"—your men can assemble the unit without drilling or machining.



A 'Budgit' Hoist on a 'Budgit' Gantry "A" Frame provides economical mobile service for machine shops, service stations and places where loads must be lifted and moved anywhere in the work area.



'Budgit'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

382 West Broadway, Muskegon, Michigan

Builders of "SHAW-BOX" and "LOAD LIFTER" Cranes, "BUDGIT" and "LOAD LIFTER" Hoists and other lifting specialties. Other Divisions produce "ASHCROFT" Gauges, "HANCOCK" Valves, "CONSOLIDATED" Safety and Relief Valves, "AMERICAN" and "AMERICAN-MICROSEN" Industrial Instruments, and Aircraft Products.

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.

EXHIBITS, MEETINGS

Western Metal Show—March 25-29, Los Angeles. (American Society for Metals, 7301 Euclid Avenue, Cleveland 3).

Welding Show—Apr. 8-12, Philadelphia. (American Welding Society, 33 W. 39th St., N. Y.).

Engineered Castings Show—May 6-10, Cincinnati. (American Foundrymen's Society, Golf & Wolf Rds., Des Plaines, Ill.).

Design Engineering Show—May 20-23, New York. (Clapp & Poliak, 341 Madison Ave., N. Y. 17).

Packaging & Handling Show—Oct. 28-31, Atlantic City. (SIPMHE, One Gateway Center, Pittsburgh 22).

Metal Show—Nov. 2-8, Chicago. (American Society for Metals, 7301 Euclid Ave., Cleveland 3).

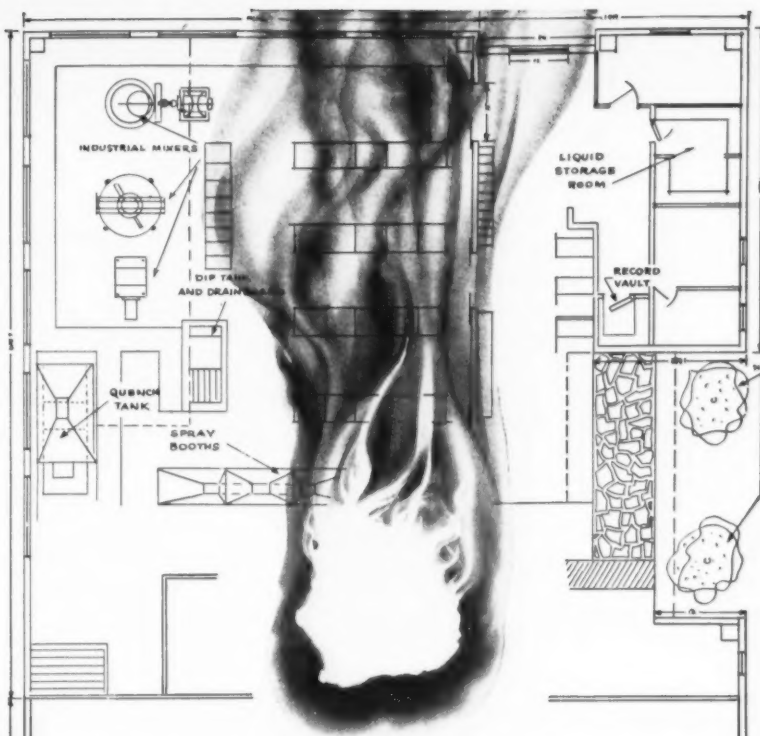
APRIL

American Hot Dip Galvanizers Assn.—Annual meeting, Apr. 2-3, The Empress Hotel, Miami Beach, Fla. Society headquarters, 1806 First National Bank Bldg., Pittsburgh.

National Screw Machine Products Assn.—Annual spring meeting, Apr. 7-11, Shoreham Hotel, Washington, D. C. Society headquarters, 2860 E. 130th St., Cleveland.

Malleable Founders' Society—Market development conference, Apr. 10-11, Edgewater Beach Hotel, Chicago. Society headquarters, 1800 Union Commerce Bldg., Cleveland.

American Society of Mechanical Engineers—Spring meeting, Apr. 8-10. Dinkler-Tutwiler, Birmingham.



Where will FIRE start in your plant?

Whatever the hazard, dip tanks, record storage vaults, spray booths, Kidde's carbon dioxide fire extinguishing system protects your plant 24 hours a day, gives you the fastest, safest fire protection ever made! Product of more than thirty years' experience, the Kidde system boasts more features than any other make on the market today. Features like:

All operating parts completely enclosed to guard against fouling or accidental operation.

No clumsy triggering methods or falling weights.

Self-contained; no outside power needed.

Visual indicators to show if system has been operated.

Easy testing of all operating parts.

No parts to replace after operation or test.

Fast-acting, clean carbon dioxide does the job that no other extinguishing agent can do: snuffs fire out in seconds, then vanishes into thin air. Won't harm valuable machinery, leaves no mess to clean up. Write for Kidde's pressure operated carbon dioxide fire extinguishing systems booklet today.

Kidde



Walter Kidde & Company, Inc.
349 Main St., Belleville 9, N. J.

Walter Kidde & Company of Canada Ltd., Montreal—Toronto



OTIS ELEVATOR COMPANY, ALWAYS
THE LEADER IN VERTICAL MATERIALS
HANDLING, HAS TAKEN ITS FIRST
STEP TOWARDS LEADERSHIP IN
HORIZONTAL MATERIALS HANDLING.

THE BAKER-RAULANG COMPANY . . .

WORLD'S WORD FOR ELEVATOR QUALITY



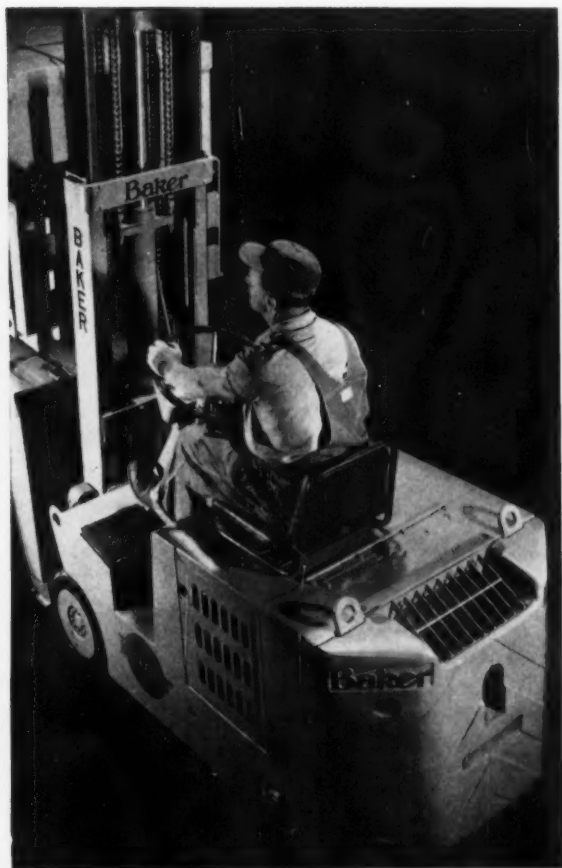
Among the products of The Baker-Raulang Company is the Traveloader, an entirely new concept in the field of mechanized handling of long, bulky loads. The Traveloader performs three distinct operations. It stacks like a fork truck, carries like a straddle truck, and delivers like a road truck. Gas or Diesel-powered Traveloaders are available in 6,000 to 30,000 pound capacities. A 4,000 pound capacity Electric-powered Traveloader with solid tires is available for indoor handling in narrow aisles.

OTIS has greatly expanded the engineering and research facilities of its recently acquired subsidiary, the **BAKER-RAULANG COMPANY**, Cleveland, Ohio. The product line has been broadened. It now includes a complete range of GAS and ELECTRIC Fork Trucks and an exclusive line of GAS and ELECTRIC side-loading Traveloader® Trucks, also Crane and Platform Trucks. You can now look to OTIS and BAKER for progress in horizontal materials handling.

.... AN OTIS SUBSIDIARY, IS THE MAKER OF

Baker®

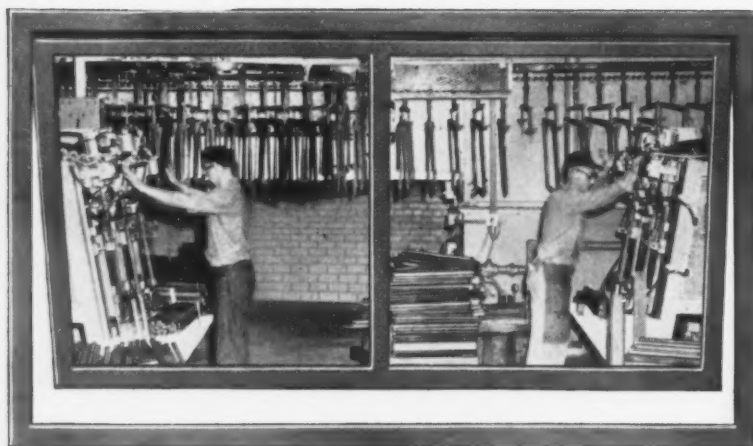
GAS AND ELECTRIC
industrial trucks



Baker's newest gasoline powered fork truck is available in many models, with capacities to 6,000 pounds. It features low initial cost, high lift, plus speed and economies of operation.



The battery-powered fork trucks in the Baker line range in capacity from 1,000 to 15,000 pounds. Baker was a pioneer in materials handling and has been producing electric industrial trucks for more than 35 years.



RESISTANCE HOT-HEADING CASEMENT WINDOW UNITS

Production Up 40%
Unit Labor Cost Down 50%
Inspection Eliminated
Morale Improved

Production of steel window frames and sash was increased by 40% and labor costs cut in half when the U. S. Gypsum Co., Warren, O., installed two Taylor-Winfield resistance welders to join parts of the two assemblies. Because of the consistent quality of the hot upset joints, the firm reassigned an inspector who formerly checked the sash and frame sections. Officials also report improved worker morale and less fatigue due to eliminating noisy air hammers that previously cold-headed the sash and frame joints.

In this streamlined assembly operation, one machine joins frames and the other joins sash. The operators place the frame and sash parts in position, where they are automatically clamped. Pairs of frame and sash go through further processing together. Adjustable tooling permits assembly of all sizes of frame and sash manufactured by U. S. Gypsum.

Finding means of increasing your production and lowering your fabrication costs is Taylor-Winfield's business. Contact the nearest T-W office.



TAYLOR-WINFIELD Corporation
 WARREN, OHIO

ELECTRIC RESISTANCE AND ARC WELDING MACHINES

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 OAKVILLE AND WINDSOR, ONTARIO



EXHIBITS, MEETINGS

Continued from P. 13

ham, Ala. Society headquarters, 29 W. 39th St., New York.

Metal Treating Institute—Annual spring meeting, Apr. 8-10, Boca Raton, Fla. Society headquarters, 271 North Ave., New Rochelle, N. Y.

American Institute of Mining, Metallurgical, and Petroleum Engineers—Annual conference of the Blast Furnace, Coke Oven, and Raw Materials Committee and the National Open Hearth Steel Committee, Apr. 8-10, Penn-Sheraton Hotel, Pittsburgh. Society headquarters, 29 W. 39th St., New York.

American Society of Lubrication Engineers—Annual meeting, Apr. 15-17, Sheraton-Cadillac Hotel, Detroit. Society headquarters, 84 E. Randolph St., Chicago.

SAM-ASME—Twelfth annual management engineering conference, Apr. 25-26, Hotel Statler, New York. Society headquarters, 74 Fifth Ave., New York.

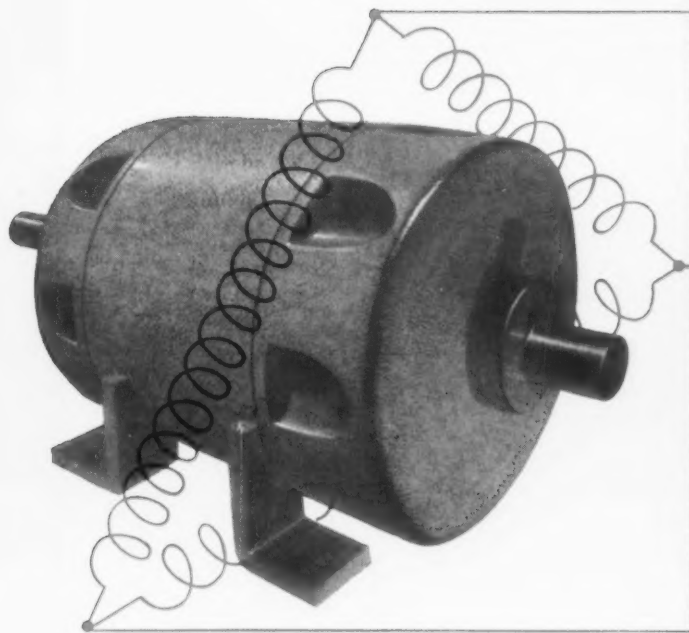
American Zinc Institute—Annual meeting, Apr. 25-26, Drake Hotel, Chicago. Society headquarters, 60 E. 42nd St., New York.

Scientific Apparatus Makers Assn.—Annual meeting, Apr. 27-May 2, Greenbrier, White Sulphur Springs, W. Va. Society headquarters, 20 N. Wacker Dr., Chicago.

Assn. of Iron & Steel Engineers—Spring conference, Apr. 29-May 1, Netherland Plaza Hotel, Cincinnati.

MAY

Copper & Brass Research Assn.—Annual meeting, May 12-15, The Homestead, Hot Springs, Va. Society headquarters, 420 Lexington Ave., New York.



SIMPLE DEPENDABLE protection against phase failure and phase reversal

A-B protector

opens control circuit in 3 to 4 cycles...under all load conditions

When men, motors, or the driven machines can be "hurt" by "phase failure" or "phase reversal" . . . the new Allen-Bradley Bulletin 812 should be used as a low cost and reliable "safety" insurance. It detects phase failures and reversals electrically, and within not more than 3 or 4 cycles, opens the motor control circuit—regardless of motor load (including no load)—and thus stops the motor.

The Bulletin 812 Type A relay protects motors against all phase failures. The Type B relay protects motors against loss of a phase and reversed phase rotation. For the first time, dependable protection is provided for motors supplied by Wye-Delta and Delta-Wye power systems having the neutral ungrounded or not connected to the circuit.

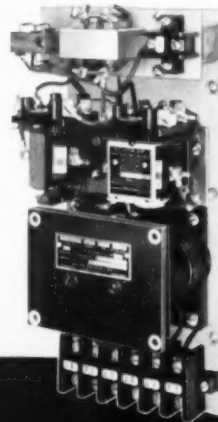
Bulletin 812 relays offer positive protection against motor or machine damage due to opening a primary line—and under all "load" conditions. No field adjustment is required. Remote reset is inherent. Furthermore, as a static device which does not rely for its operation on "motor" revolution the possibility of failure to operate is eliminated.

Bulletin 812 relays are built in four sizes which will reliably protect motors with full load currents from 1.25 amperes to 300 amperes. Let us send you more information about this dependable answer to phase failure and phase reversal problems.



Bulletin 812 Type A phase failure relay protects a 3-phase motor against loss of a phase.

Bulletin 812 Type B phase failure and phase reversal relay protects a 3-phase motor against both loss of a phase and phase reversal.



ALLEN-BRADLEY
QUALITY
MOTOR CONTROL



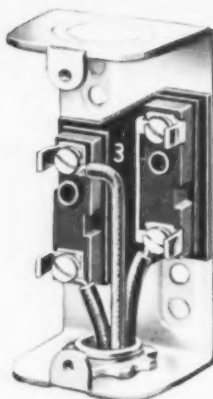
Allen-Bradley Co.
1316 S. Second St.
Milwaukee 4, Wis.

In Canada—
Allen-Bradley Canada Ltd.
Galt, Ontario

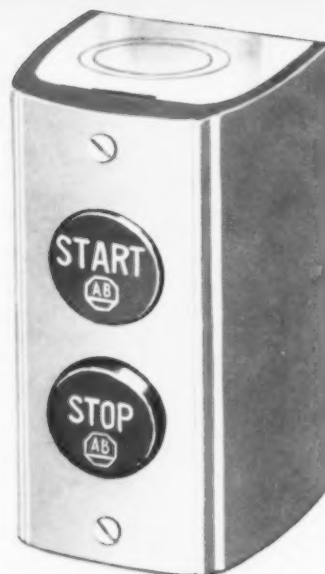
new Allen-Bradley Bulletin 800 Standard-duty Push Buttons **CAN BE WIRED IN HALF THE TIME!**



CONTACT MECHANISM IN THE COVER—COMPLETELY PROTECTED FROM CARELESS SCREWDRIVERS AND CARELESS WIRING.



WIRING TERMINALS IN THE BASE—COMPLETELY EXPOSED FOR EASY WIRING.



Here's an entirely new idea in push button stations—a wrap-around cover which contains and protects the contact mechanism. Removing the cover exposes all terminals for instant and easy wiring. Heavy, silver plated contacts connect the push button assembly in the cover with the terminals in the base.

Matching ribs in the cover and notches in the molded terminal base eliminate the possibility of having wiring connections made incorrectly. A molded, bakelite shield protects the contact mechanism and prevents careless wiring from interfering with contact operation. All push button contacts are silver and of the double break construction.

Specify the new Allen-Bradley standard-duty station on your next order. Its installation time-saving feature, alone, should make you a regular customer!

Bulletin 800 standard-duty push buttons—with strong, gray, molded cover are "good-looking" and "safe" in operation. All stations have dual knockouts, top and bottom.



4-57-MR

SELECTOR SWITCH

You can't beat this for convenience—a selector switch with the same easy-to-wire construction as the push buttons, shown above—plus the feature that you can change—in seconds—from two position to three position (or vice versa)! The correct name plate is furnished with each switch. See for yourself how easily this is accomplished.



CHANGE IT FROM 2 POSITION TO 3 POSITION (or vice versa)...in 30 Seconds!



ALLEN-BRADLEY

QUALITY

MOTOR CONTROL

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ontario

Packaged in cans
for convenient use

ELECTROMET Exothermic Chrome

3 alloys to suit
your specific
needs

With these advantages

- fast solubility
- high ignition temperature
- chromium recovery of about 92%
- no weighing—cans contain exact amounts of alloy—just count the cans
- palletized shipment for convenient handling

Exothermic Ferrochrome 5

Has a 20 to 1 chromium-to-carbon ratio, gives only 0.05% carbon pickup for each per cent of chromium added.

Exothermic Ferrochrome 8


Has a 12.5 to 1 chromium-to-carbon ratio, gives a carbon pickup of 0.08% for each per cent of chromium added.

Exothermic Silicon-Chrome

Has the following analysis: Chromium—41.50 to 44.50%; Silicon—21.75 to 24.75%; Carbon—0.70%. Carbon pickup is only 0.016% for each per cent of chromium added.

Check ELECTROMET—for experienced technical assistance . . . fast deliveries . . . a complete line.

ELECTRO METALLURGICAL COMPANY

A Division of
Union Carbide and Carbon Corporation
30 E. 42nd Street  New York 17, N. Y.

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FERRO-ALLOYS AND METALS



**cuts going
cuts coming...that's**
Double-Cutting

No idle return stroke—cuts both ways. That's why this new GRAY UNIVERSAL PLANER is the most productive planer ever built. Instantaneous change-over from standard to double cut planing. Simple standard carbide tooling.

GRAY is building a large number of these new planers for customers who have recognized that a planer pays when it cuts. This Gray Universal single cuts, double cuts, triple cuts, cross cuts and substantially cuts your set-up and handling time.

The G. A. GRAY Co., Cincinnati, Ohio



heavy-duty planing

The Gray Universal is the world's most powerful planer available for conventional planing. Its rigidity and speed are ideally suited for modern carbide cutting.




double cut planing

The flick of a lever, the touch of a button permits double cutting. Elimination of the idle stroke insures the world's most efficient flat surface machining. Only simple carbide tools are required.



GRAY

UNIVERSAL



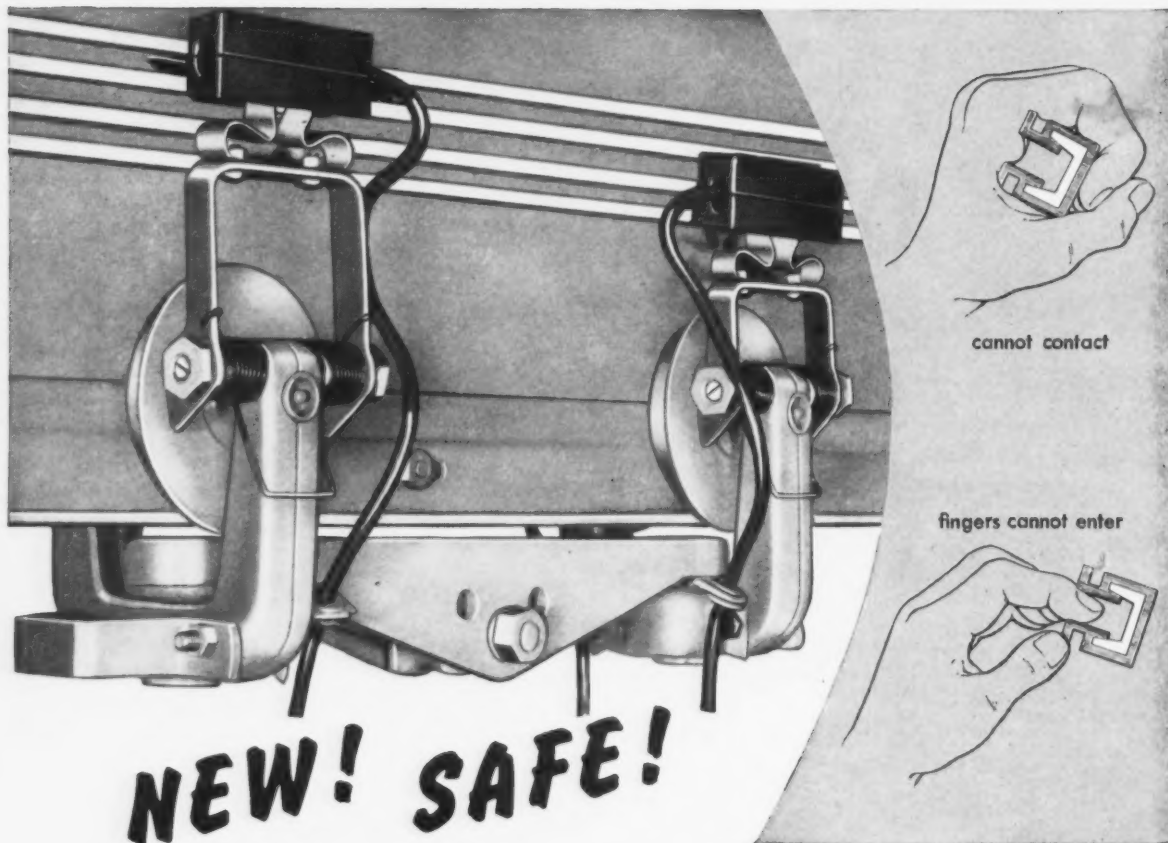
triple cut planing

Rough and rough-finish plane at the same time. Rough by double cut planing and simultaneously rough-finish with a single point tool. Then finish plane without a tool change.



cross planing

Eliminates extra settings by cross planing the occasional keyways, chamfered corners, and other troublesome small cross surfaces that formerly added hours to your set-up time.



NEW! SAFE!

AMERICAN MONORAIL
KANT SHOCK
SHIELDED ELECTRIFICATION
For Monorail Track and Crane Systems

By covering its standard bus bar electrification with a specially designed polyvinyl chloride extrusion, American MonoRail now furnishes completely safe electrified systems.

This KANT-SHOCK shielding absolutely prevents accidental contact with live bus bars. It is impossible for an adult's finger to enter the shield.

A new type sliding shoe collector provides a floating contact throughout a monorail system regardless of any misalignment due to bent bars or at switch and inter-lock connections.

KANT-SHOCK Electrification positively eliminates all the hazards of open bar conductors—prevents costly accidents—protects employees—reduces insurance rates.

Write for KANT-SHOCK Bulletin KS-1

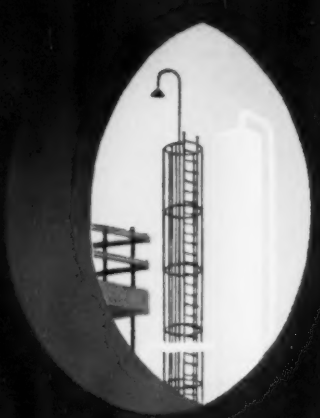
Member of Materials Handling Institute and Monorail Manufacturers Association
 For Power Driven Conveyors, Use Landahl Chainless Conveyors



AMERICAN

MONORAIL COMPANY

13103 ATHENS AVENUE, CLEVELAND 7, OHIO (IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)



Steel Fabrication for the Petro-Chemical Industry

These are the things that will mean money in the bank to you when you place your order with Levinson:

- **SPECIALIZED** know-how from many years of working with leading contractors and engineering firms in the petro-chem field.
- **DEPENDABLE** delivery based on steel in stock and flexible production scheduling.
- **ADAPTABILITY** to the many problems of engineering changes while work is in process.

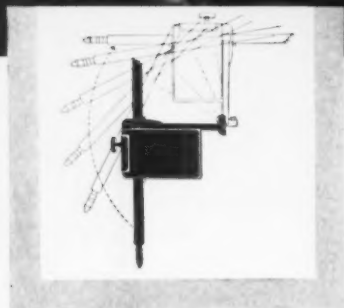
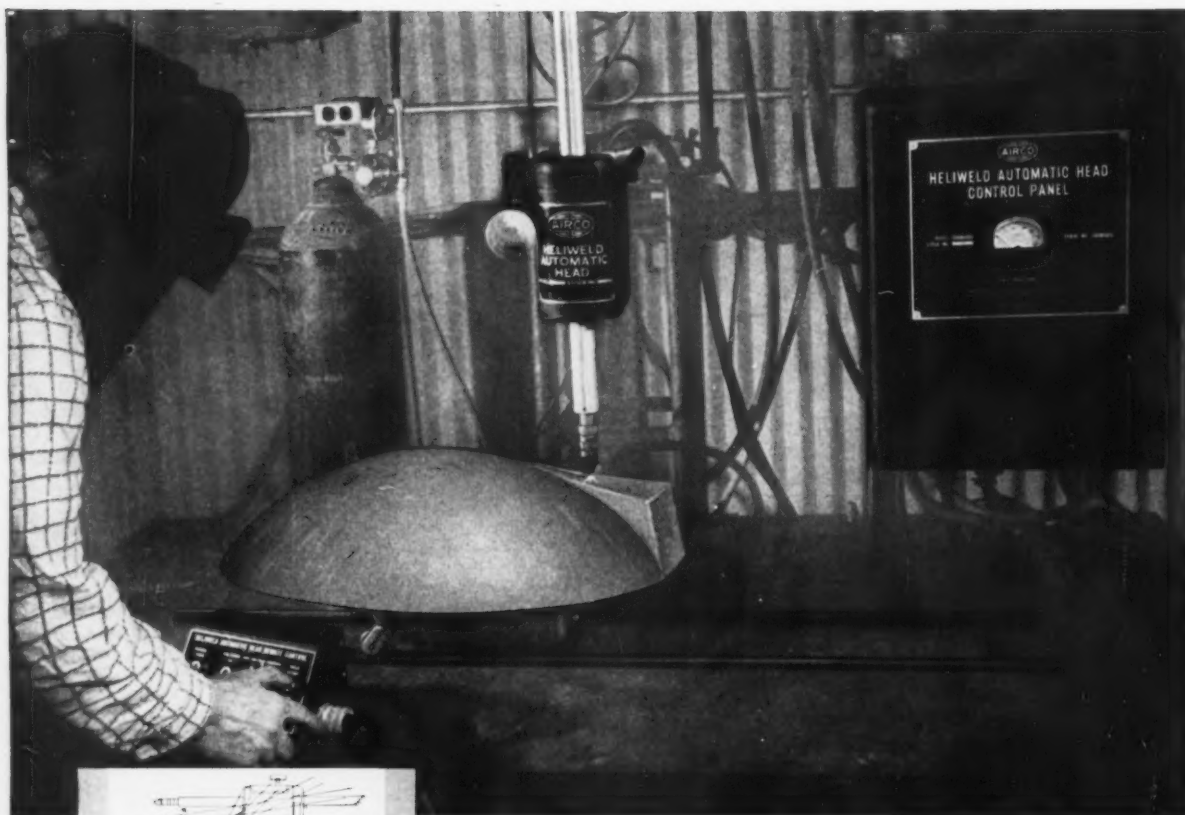
just...Leave it to **LEVINSON**

the
LEVINSON

Warehouses, fabricators, designers of steel for over half a century



COMPANY
Pittsburgh 3, Pa.
Phone: HUbbard 1 3200



◀ New Airco Model C Heliweld automatic head operates at all angles from horizontal to vertical.

Airco introduces New Automatic Heliweld Head for long-run production welding

The Model C Heliweld automatic head is specifically designed for long-run production on regular or irregular contours — aluminum tubing, motor stators, irregularly-shaped pressure vessels. Its prime advantage is that once the required arc length is set the head will automatically maintain this distance by moving the holder up or down to follow the contours of the work piece. Other benefits are:

- **Versatility** — unit provides good arc voltage control using either argon or helium shielding gases or mixture of both.
- **Adaptability** — the head can be operated at all angles from the horizontal to the vertical (normal) position.

The maximum raise-lower distance of the electrode holder is a full 16".

- **Flexibility** — the assembly can be used for AC or DC welding, with or without filler wire. Electrode diameters range from .020 to 1/8".

The use of the new automatic head will be required where welds of consistent dimensions and quality are important and where good weld appearance is necessary or where welding specifications are very high for the electrical, aircraft, and refrigeration industries. Complete information covering the wide range of applications and detailed specification data is available. Write Airco at the first opportunity.

welding
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Air Reduction Canada Limited

Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** — carbon dioxide — gaseous, liquid, solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl acetate, alcohols, and other synthetic resins.



Why Grandmother!

Stories on grinding wheel problems—just like the kind you tell the youngsters—can have a happy ending. And we're writing new ones day after day for plants where high grinding wheel costs and low production have been wolfing up profits.

If *you* are ready to "cry wolf," let us send CINCINNATI (PD)[®] WHEELS to the rescue. For *now* CINCINNATI Grinding Wheels offer POSITIVE DUPLICATION—a remarkable achievement in precision manufacturing and quality control that can *save you money—and increase your production.*

Through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS are priced no higher than ordinary wheels.

So, if grinding problems have you ready to shout for help, just contact your CINCINNATI Grinding Wheel distributor. Or, contact us direct and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone—Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio. Remember—*only* CINCINNATI Grinding Wheels give you . . .

(PD) POSITIVE DUPLICATION


CINCINNATI
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

® Trade Mark Reg. U. S. Pat. Off.

Where Spring Steel Makes Muscles



Uniform quality of steel from Thomas Strip Division, used for links on Morse Chain's rugged Hy-Vo power transmission drive, shows up as assembled chain is checked with a Vernier Gauge.

► Quality Thomas Strip Scores High As Links for Morse Chain's Rugged Hy-Vo

Because Morse Chain Company's Hy-Vo Chain transmits more power per inch of width than any conventional chain, it handles some of industry's toughest jobs.

And Hy-Vo can do its power transmission jobs at speeds up to 90 miles an hour.

There's a job in the oil fields, for example, that demands the kind of muscles Hy-Vo has—muscles that Pittsburgh Steel Company's Thomas Strip Division builds into Hy-Vo's durable links.

This tough oil field application requires a rugged four-inch wide power chain to transmit maximum horsepower to pumps operating at pressures up to 10,000 psi.

Thanks to precision engineering at Morse Chain and uniform quality steel, Hy-Vo takes this punishment in stride.

To make such a dependable, trouble-free power chain drive, Morse Chain—a division of Borg-Warner—buys the best steel made.

That's why tons of quality, cold rolled, high carbon spring steel strip from Thomas Strip are shipped each month to Morse Chain's Ithaca, N.Y., plant. Each coil must meet Morse Chain's demand for strip that has:

- **Punchability and Shearability** which show up on Morse high speed piercing and blanking presses making the chain links.

Uniform quality in the strip adds

to the number of strokes possible before tools must be reground or sharpened.

Norman Bremer, chief engineer at Morse, underscored the importance of longer tool life when he declared:

"The more strokes we get between grinds, the lower our operating expenses."

- **Holding Tolerances** from shipment to shipment and from coil to coil. A foot length in any of the four sizes of the Hy-Vo can vary only from zero to plus 15 thousandths of an inch.

Even minute variations in thickness on each of the links that make up a width of Hy-Vo chain are enough to cause excessive stack-up in the assembly of the chain. Result: a rejected chain.

What's more, in a given length of Hy-Vo chain there are hundreds of links and many pins which require extremely close tolerances.

"Our experience with Thomas



Sample coils of Thomas Strip are taken to the Morse Metallurgical Lab for checks on chemical analysis.



Punchability and shearability qualities of Thomas Strip appear as coil is fed into a piercing and blanking press.



After links are blanked, tolerances on hole sizes are checked closely so that pins joining links will fit snugly.



Careful hand assembly of each Hy-Vo Chain follows after heat-treating and blackening of links. Fine grain cold rolled spring steel from Thomas Strip prevents undersize holes and excessive burrs.

Strip's ability to meet our rigid tolerance requirements has been very satisfactory," said Ted Sharp, Mr. Bremer's assistant. Just as it does in any application . . . including fasteners, springs or automotive parts. . . . Thomas cold rolled high carbon strip gives Morse these advantages:

- **Hardenability** that shows up during the rapid fire piercing and blanking operations. Too soft or too hard strip boosts the rejection rate and takes its toll of costly tools.

This is especially important because Hy-Vo Chain must meet an average ultimate tensile strength of 20,000 pounds per inch of pitch and width.

- **Uniformity in Micro-structure** adds to tool life and aids cleanliness in piercing and blanking links.

- **Standard Size Coils** of Thomas Strip's spring steel keep production humming and orders filled for Morse customers. Small size coils slow up the

production pace because machines have to be stopped for each new coil.

If your product requires high carbon spring steel, you can duplicate the benefits Morse Chain Company gains through using Thomas Cold Rolled Strip. Whatever your needs for top quality steel strip specialties it will pay you to consider Thomas

Strip. It's available plain or already coated with zinc, copper, brass, nickel, lead alloy or tin in a wide variety of finishes.

Get in touch today with Thomas Strip through any district sales office listed below. Trained engineering help is available to help solve your production problems. Call now.

Thomas Strip

DIVISION

Pittsburgh Steel Company

Grant Building

Pittsburgh 30, Pa.

District Sales Offices

Atlanta
Chicago
Cleveland

Columbus
Dallas
Dayton

Detroit
Houston
Los Angeles

New York
Philadelphia
Pittsburgh

Tulsa
Warren, Ohio





*Does your **Cylindrical** problem call for
a **Centrifugal** solution?*

If your product plans call for hollow cylindrical parts, give some thought to these facts. Manufacturers who had never seriously considered cast parts before are discovering important advantages in Sandusky centrifugal castings.

They're getting exceptional resistance to heat, corrosion, abrasion and stress, through the use of special alloys cast centrifugally . . . in diameters from 7" to 54", and lengths to 33 feet depending on diameter . . . and specially machined to specifications.

How can our versatile staff and facilities help you? Tell us your product requirements. Let us explore your ideas. Perhaps we can help solve your cylindrical problems through the vast foundry experience, metallurgical research and machining skills our 46 years offer.

Your request will bring more information promptly . . . or, if you prefer, a personal call by one of our engineers. Sandusky Foundry and Machine Company—Sandusky, Ohio.

Sandusky centrifugal castings offer you 4 important advantages:

1. **SUPERIOR STRENGTH**—through non-directional mechanical properties
2. **BETTER QUALITY**—machined castings are porosity free
3. **UNIFORM SOUNDNESS**—harmful inclusions are forced out by spinning motion
4. **JOB-READY FINISHED CASTINGS**—reach you machined exactly to your specifications . . . eliminating extra costs from rejects, down-time, loss of production, etc.

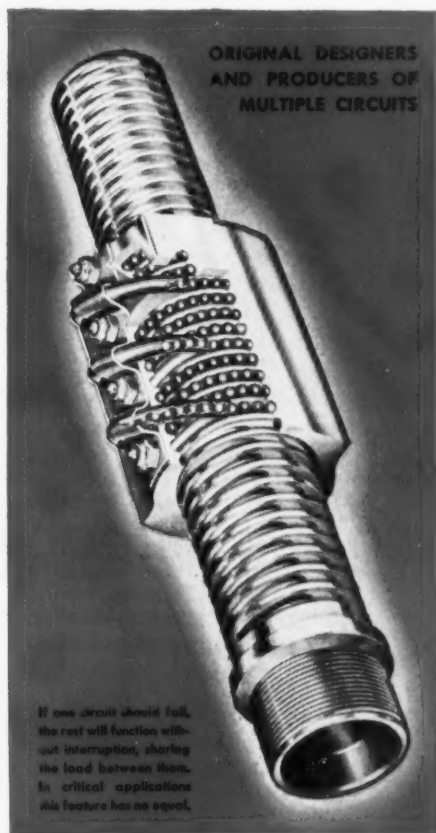


Sandusky Centrifugal Castings

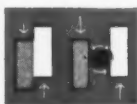
Stainless steels—plain carbon and low alloy steels—wide variety of copper base compositions

SAGINAW b/b SCREWS are guaranteed 90% EFFICIENT!

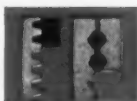
Require 4/5 LESS torque than Acme Screws for same linear output on Actuator and Positioner Applications! Saves space, weight!



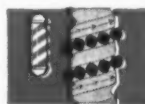
WHAT IT IS AND HOW IT WORKS



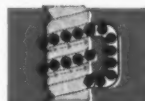
Let's start at the beginning, with the familiar principle that there's far less friction in *rolling* than in *sliding*. By applying this principle,



the Saginaw ball/bearing Screw radically increases the efficiency of rotary-to-linear motion (and vice versa). Instead of *sliding*, mating surfaces glide on rolling steel balls.



Like stripes on a barber pole, the balls travel toward end of nut through spiral "tunnel" formed by concave threads in both screw and mating nut.



At end of trip, one or more tubular guides lead balls diagonally back across outside of nut to starting point, forming closed circuit through which balls recirculate.

SIX DESIGN ADVANTAGES

- 1. Vital Power Savings.** Permit much smaller motors with far less drain on electrical system, simpler circuitry.
- 2. Space/Weight Savings.** Screws themselves are smaller, lighter; permit smaller motors and gear boxes; eliminate auxiliary equipment required by hydraulics.
- 3. Precise Positioning.** Machine-ground type will position components far more precisely than hydraulics or pneumatics; tolerances on position are held within .0006 in./ft. of travel.
- 4. Temperature Tolerance.** Normal operating range from -75° to $+275^{\circ}$ F.; in selected materials, will function efficiently as high as $+900^{\circ}$ F.
- 5. Lubrication Latitude.** If lube fails, will still function with remarkable efficiency. Units have been built and qualified for operation without lubrication.
- 6. Fail-Safe Performance.** Far less vulnerable than hydraulics; Gothic-arch grooves, yoke deflectors and multiple circuits provide added assurance against failure.

SAGINAW b/b SPLINE



Utilizing the same basic *gliding ball* principle, Saginaw has developed the *Saginaw b/b Spline* which radically increases the efficiency of transmitting or restraining high torque loads.

Averages 40 times lower friction coefficient than sliding splines!

It can be fitted with integral gears, clutch dogs, bearing and sprocket seats, etc., for use with a wide variety of electrical units. Units have been built from 3 inches to 10 feet long— $\frac{3}{8}$ to 6 inches in diameter.

Available in custom machine-ground and stock rolled-thread types. Units have been built from $1\frac{1}{2}$ inches to $39\frac{1}{2}$ feet long— $\frac{3}{8}$ to 10 inches in diameter.

Saginaw
b/b
bearing
Screws & Splines

SAGINAW STEERING GEAR DIV., GENERAL MOTORS CORP., SAGINAW, MICH.

SEND COUPON FOR NEW 1957 ENGINEERING DATA BOOK

or see our section in Sweet's Product Design File
Saginaw Steering Gear Division, General Motors Corp.
b/b Screw and Spline Operation
Dept. 6X, Saginaw, Michigan

Please send new engineering data book on Saginaw b/b Screws and Splines to:

NAME _____
COMPANY _____ TITLE _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____





Another plant tames sulphuric acid with *Carpenter* Stainless No. 20 and No. 20Cb

An automatic sulphuric acid dilution system, with Carpenter Stainless No. 20 and No. 20Cb preventing corrosion at critical points, is cutting acid costs and reducing dangerous acid handling for a Tennessee textile plant. Savings with the system in its first year of operation equaled the total initial cost. Carpenter No. 20 and No. 20Cb control corrosion attacks of H_2SO_4 concentrations up to 23% in a cutting tank (shown above), piping and pumps.

Whether you have sulphuric acid solutions or other strong corrosives to handle, see how Carpenter Stainless No. 20 and No. 20Cb can help you cut corrosion costs by keeping acid handling equipment on the line longer.



Write for a copy of the Carpenter Stainless No. 20 and No. 20Cb handbook containing physicals, corrosion resistance and fabrication data.

These super corrosion-resistant alloys are available in tubing, pipe, sheet, plate, bars, strip, wire and billets to meet your exact requirements.

See your nearest Carpenter Distributor for full information and help on your particular application for Carpenter Stainless No. 20 and No. 20Cb.

MEMBER



**The Carpenter Steel Company,
Alloy Tube Division, Union, N. J.**

Export Dept.: The Carpenter Steel Co., Port Washington, N.Y.—"CARSTEELCO"




Stainless No. 20 & No. 20Cb

Carpenter No. 20 bars, strip, wire and billets are available also from The Carpenter Steel Company, Reading, Pa.



Tongue support part for New Holland baler, prepared with 75-ton Warco inclinable punch press, is shown fitted in place on Hayliner 68 assembly line at New Holland, Pa. Inspecting the job is Sub-assembly Foreman Lee Larkin.

Warco PRESSES

...Stand up!"

"Not a breakdown in five years," says leading farm machine manufacturer

• Several years ago New Holland Machine Company, New Holland, Pa., purchased their first Warco Press . . . an inclinable punch press. It is still working as good as the day they bought it. Since then they have added other Warcos for piercing, blanking and forming a variety of machine parts. "We find these presses very satisfactory," say New Holland officials; "in our five years of using Warcos we have never had a breakdown."

Warco Presses stand up because they are built from the frame out to deliver maximum performance in the most difficult assignments.

THE FINISHED PRODUCT... Warco inclinable punch press had a hand in turning out this smart-looking, smooth-performing Hayliner 86 baler. The machine was designed to bring the average-size farm big baling capacity at smaller baler cost.



Using a 75-ton Warco inclinable punch press, operator Christian Good turns out tongue support parts. Watching the operation is Assistant Foreman Lester Howe. Ten-gauge hot-rolled sheet steel is used for the part.

Federal
WELDERS

The Federal Machine and Welder Company

WARREN, OHIO

Warco
PRESSES

Precision by the Truckload - - they're Blanchard ground!

This truck is loaded with 14 tons of steel. Its cargo is 33 soft steel plates, each measuring $27\frac{1}{2}$ " x $25\frac{1}{2}$ " x 11.125", and ground to $\pm .001$ " on a Blanchard Surface Grinder.

Dies up to 84" across corners, can be ground on a Blanchard at great savings. Grinding can be controlled without guesswork—leaving a flat, sharp die—as soon as the entire surface is cleaned up. Die resharpening on the Blanchard allows you to get maximum life from your valuable dies and end plates.

Ask for details on the 15 standard Blanchard models.

For best results in surface grinding . . .

PUT IT ON THE

BLANCHARD

THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS.

THE BLANCHARD MACHINE CO., 64 State St., Cambridge 39, Mass.

Gentlemen: Please send me a free copy of "The Art of Blanchard Surface Grinding" (3rd edition) and "Work Done on the Blanchard" (5th edition)

NAME _____


STREET _____

FIRM _____


CITY _____

ZONE _____ STATE _____


The right disc *surface* can *lower* your abrasive costs!



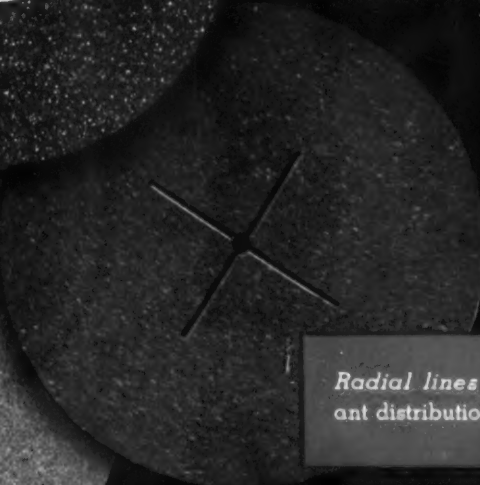
Deep corrugated for fast, cool cutting: small, medium and large corrugations



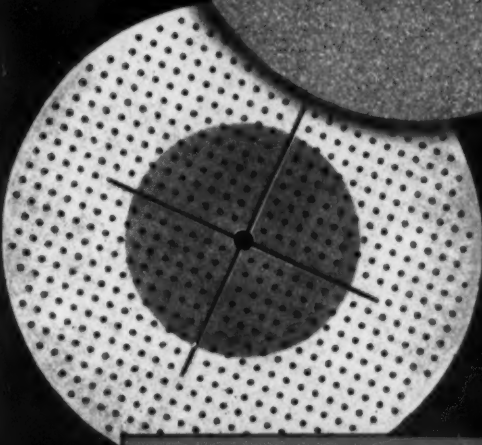
Smooth face for general purpose grinding: small areas, fine finishes



Two grades to maintain disc flatness on heavy shear cuts



Radial lines for better coolant distribution

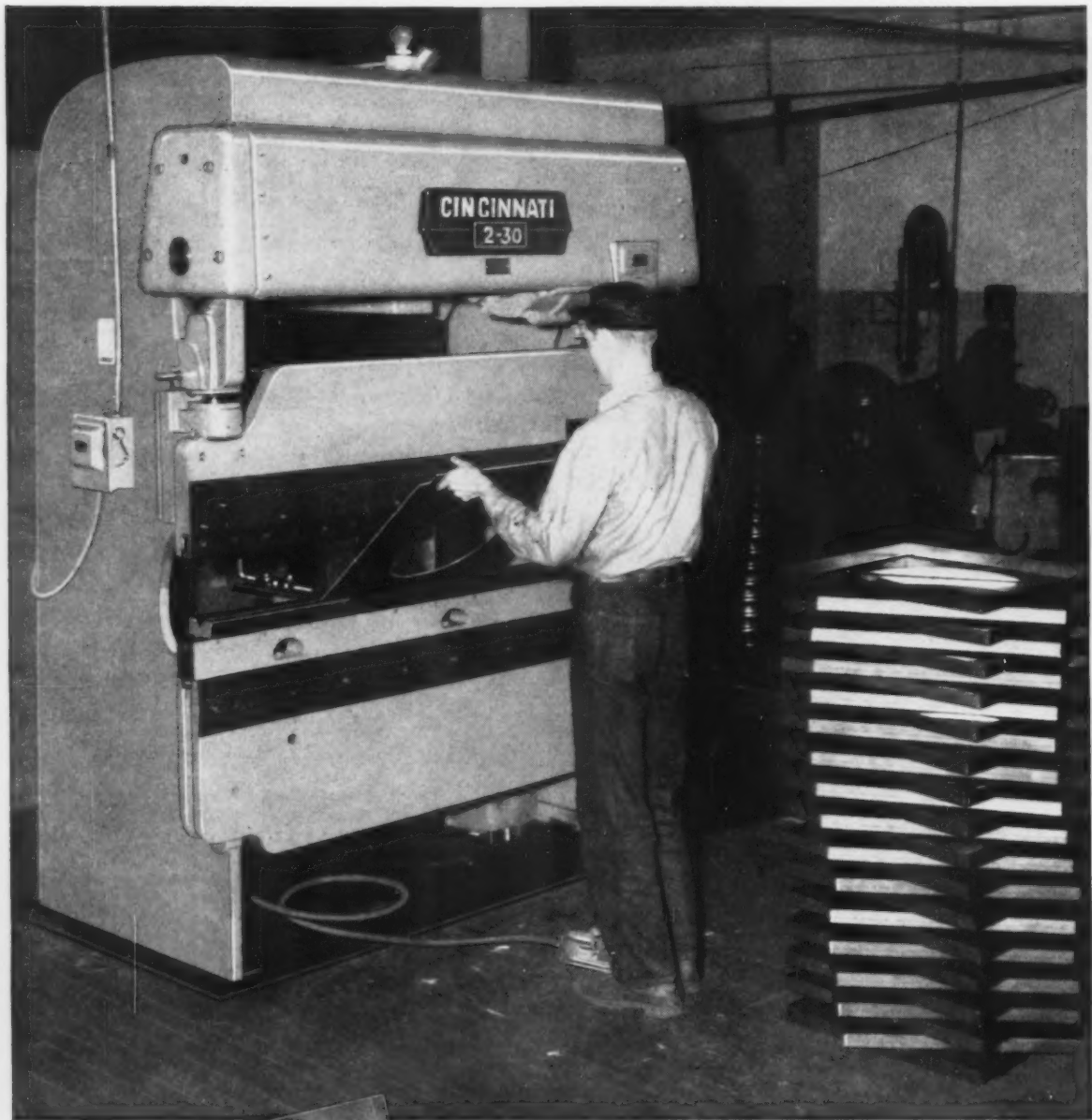


there's a Gardner Disc Surface to fit every job ...

Combination for special applications

GARDNER
abrasive discs
BELOIT, WISCONSIN

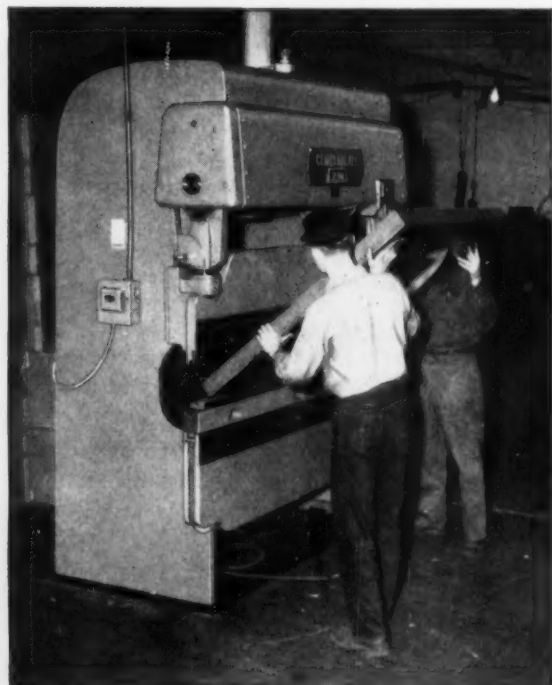
This accurate Cincinnati



Typical fan housing
produced by
Anchor Metal Spinning Co.



Press Brake saves money and time...

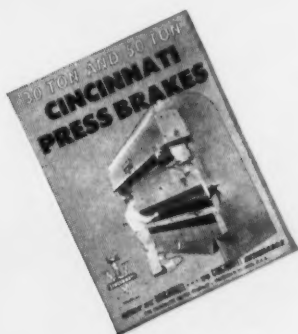


Photos courtesy of Anchor Metal Spinning Company.

at **ANCHOR METAL SPINNING CO.**
Dayton, Ohio

Profitable production has been achieved by installing this Cincinnati Press Brake.

Accurate flanging of fan housings is done rapidly while meeting the rigid requirements for squareness. Operations on different sizes and gauges of materials are performed with ease. Parts for assembly are ready on time and smooth shop operation maintained.



Write **Department B** for Bulletin B-6 "30 Ton and 50 Ton" Cincinnati Press Brakes.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES



They cut out three oils by changing to one...



Standard Oil lubrication specialist Bob Cleland and plant manager I. G. Smallegan inspect work furnished by operator Dick Stockwell. Giving technical help to customers like this is something for which Bob Cleland is well fitted. Bob has a mechanical engineering degree from Michigan State and has completed the Standard Oil Sales Engineering School.



STANICUT Oil 166 BC

Screw machine plant saves on oil inventory and handling, receives other benefits by converting to dual-purpose cutting oil.

Grand Rapids Metal Products Company's problem was the mixing of cutting and lubricating oils in their National Acme and Gridley screw machines. In all, four oils were used. In some machines a cutting oil, two lubricating oils and a base oil were employed to improve machining characteristics. Lubricating oil leaking past seals mixed with the cutting oil, reducing cutting oil qualities. Oil mixtures were constantly varying, and troubles in tapping resulted.

Standard Oil's Bob Cleland, working with plant management, suggested STANICUT Oil 166 BC. This oil, he explained, is a dual-purpose oil. It can be used for lubrication as well as for cutting, and no dilution of the cutting oil can occur.

After a week's trial in one machine, the entire plant was converted to STANICUT Oil 166 BC. Tap troubles were reduced, resulting in much less down time. Spindle speeds have been increased, yet the spindles run cool. Oil inventories have been reduced from four to one.

STANICUT Oil 166 BC does not corrode bearings, gears, bushings, spindles or other machine parts. While STANICUT Oil 166 BC contains E.P. additives, it does not stain copper or brass.

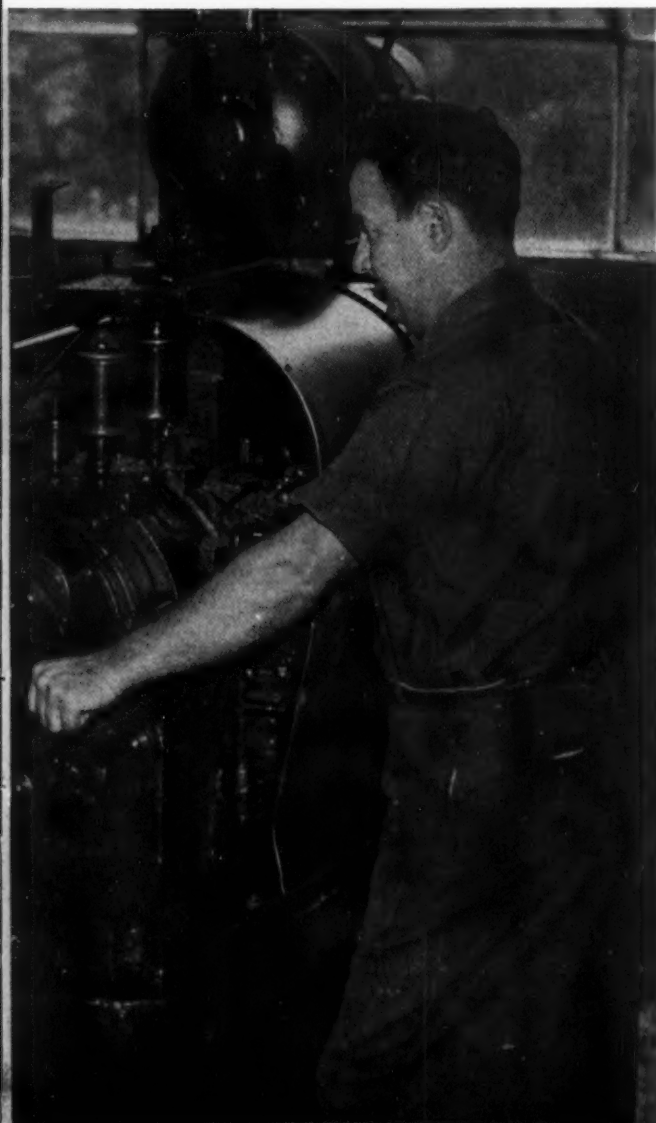
Get the facts on how STANICUT Oil 166 BC can help you. Call the Standard Oil office nearest you anywhere in 15 Midwest and Rocky Mountain states. Or write to Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Quick facts about STANICUT OIL 166 BC

1	A dual-purpose oil — suitable for both cutting and lubrication.
2	Non-corrosive to work or machines.
3	Formulated with E.P. additives.
4	Stable under all normal conditions.
5	Non-irritating.
6	A cutting oil that permits high operating speeds.
7	Non-staining to either copper or brass.

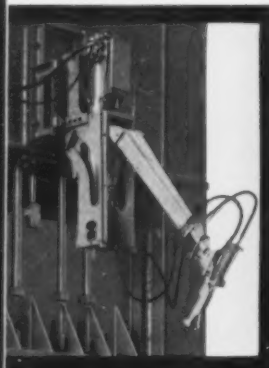


STANDARD OIL COMPANY
(Indiana)

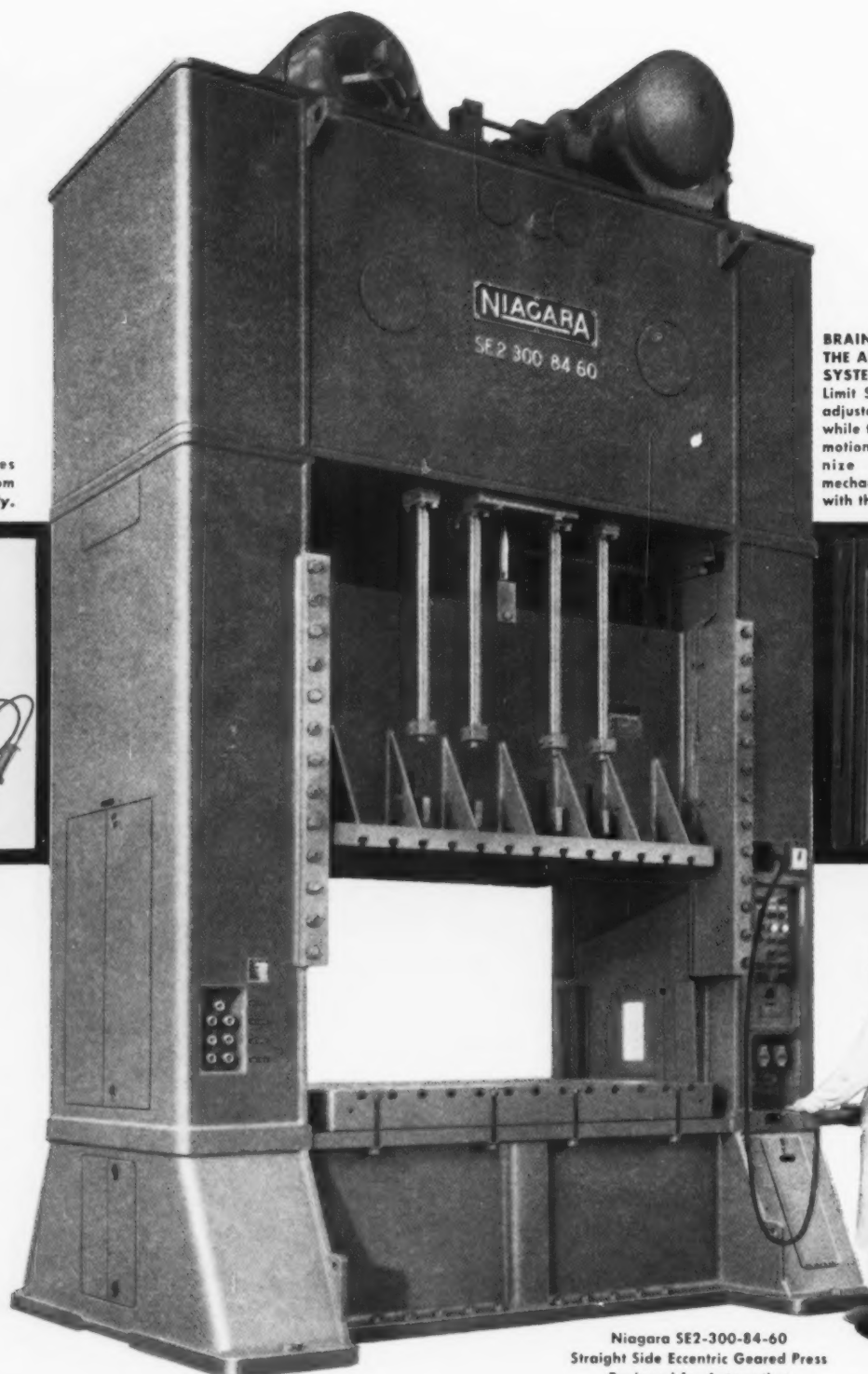


see how mighty Niagara Presses

IRON HAND removes finished stampings from the press, automatically.



BRAIN CENTER OF THE AUTOMATION SYSTEM, the Rotary Limit Switch can be adjusted precisely while the press is in motion to synchronize automation mechanical devices with the press cycle.



Niagara SE2-300-84-60
Straight Side Eccentric Geared Press
Equipped for Automation

are automated for peak productivity

Engineered to excel in large, heavy tonnage drawing, punching and blanking work, Niagara Straight Side Eccentric Geared Presses are readily outfitted with the most advanced automation controls and devices. Net result: Streamlined production, greater safety and simplified operation.

Take a look at the modern, enclosed construction of this rugged Niagara Two-Point Eccentric Geared Press. See how today's most advanced automation controls and devices are furnished as integral, built-in components of the press itself . . . *with piping and wiring fully concealed.* Note, too, how the driving assembly is neatly housed within the crown. Nothing has been overlooked in making this press an outstanding engineering triumph.

Niagara's eccentric drive delivers greater torque with less deflection. Rigid, all-steel, four-piece, tie rod frame provides utmost accuracy and prolonged

die life. Niagara's low inertia, pneumatic friction clutch runs cooler and outlives others, for most of its weight continues to rotate with the flywheel to reduce heat and wear.

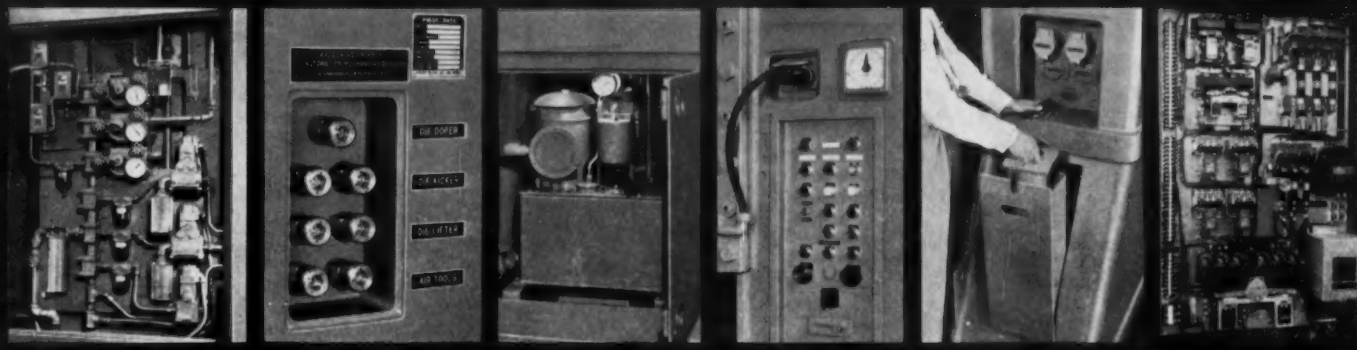
MAKE SURE THAT YOU HAVE ALL OF THE FACTS on Niagara Straight Side Eccentric Geared Presses . . . the one point, two point and four point designs in capacities from 100 - 1000 tons . . . and how they can be equipped for automation. Write for illustrated Bulletin 66 today.



NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N.Y.

DISTRICT OFFICES: Buffalo • Cleveland • Detroit • Indianapolis • New York • Philadelphia

Distributors in principal U. S. cities and major foreign countries



AIR CONTROL PANEL (Above left) conceals and protects air line pressure switches, lubricators, filters, gauges and valves behind dust-tight doors within one of the uprights.

CONTROLLED AIR SUPPLY RECEPTACLES (Above right) are provided for die doper, die kicker and die lifter, all synchronized with press cycle. Auxiliary receptacles are for die maintenance tools.

AUTOMATIC CIRCULATING OIL SYSTEM (Above left) sends metered flow of clean, filtered oil to all bearings and gears in the crown, as well as to slide gibs. Correct operating oil pressure is maintained or press stops automatically.

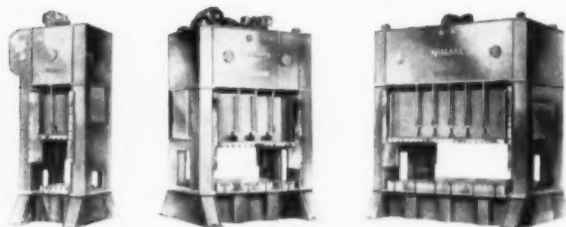
OPERATOR'S PANEL (Above right) features deluxe operating controls conveniently arranged for fingertip direction of every press motion. Note receptacle for "RUN" push button station and Selsyn stroke position indicator.

AUX. POWER SUPPLY & SAFETY BLOCK. (Above left) Two 110 V. and two 440 V. receptacles for automation equipment, conveyors, tools, etc. Safety block (stored in bin) is chained to safety plug which de-energizes press control when pulled from receptacle.

COMB. MOTOR & PRESS CONTROL (Above right) in oil and dust-tight enclosure flush mounted in frame.

ONE-POINT, TWO-POINT AND FOUR-POINT SUSPENSION

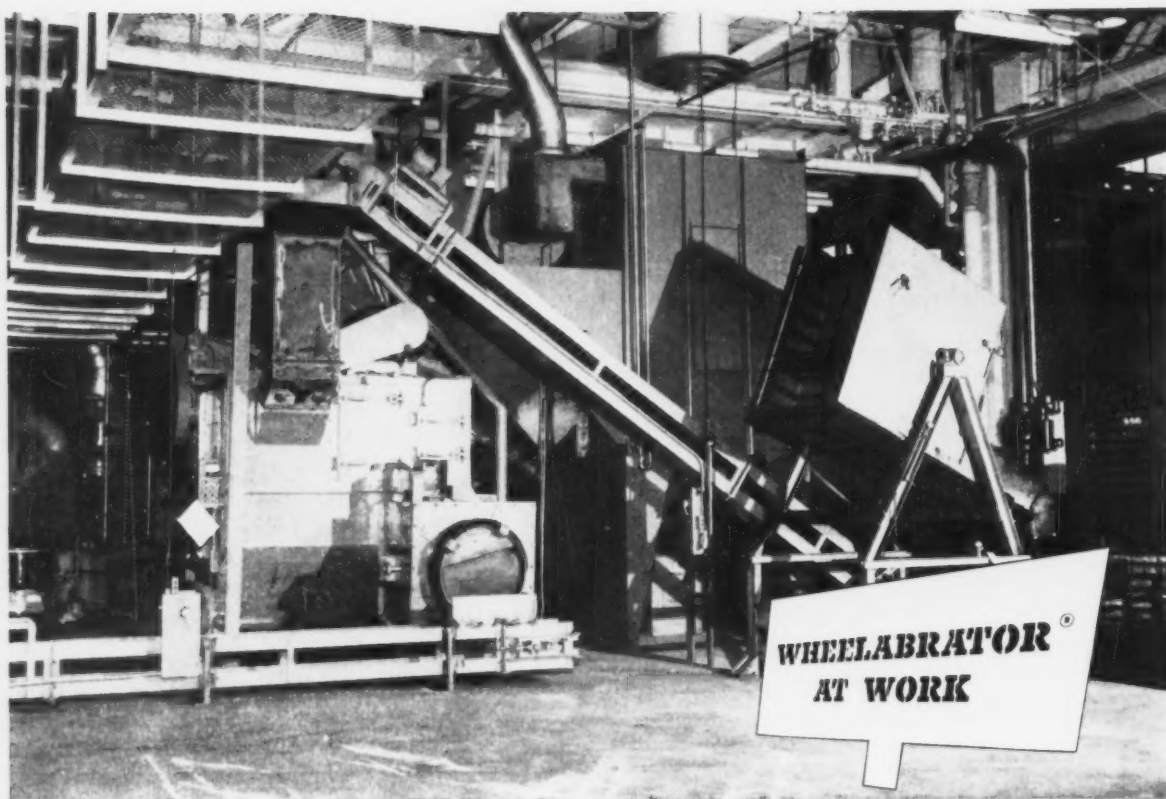
(100 through 1000 ton capacities)



NIAGARA

straight side
ECCENTRIC GEARED presses

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work.



NO MAN HOURS FOR CLEANING HERE!

*airless blast equipment becomes
an integral part of automated line in
processing automotive forgings*



The picture above was taken during the normal production schedule of a large, mid-western automotive plant. The 26" Continuous Wheelabrator Tumblast shown is one of several that have been incorporated into automated processing lines for forgings and machined parts. Forgings, brought to the machine by lift truck are dumped from the tote box (shown upended at the right of picture) into a hopper, and then fed by conveyor into the high-production airless blast Continuous Tumblast where all forging scale is uniformly removed. Emptying on to another conveyor, the cleaned forgings are carried on to heat treat operations, into another Wheelabrator machine, and then on to machining. High capacity and freedom from mechanical problems and maintenance difficulties assure required performance of Wheelabrator equipment with a very minimum of attention.

For detailed information on Wheelabrator principles and savings, write today for your free copy of Bulletin 74-C



WHEELABRATOR
CORPORATION

510 South Byrkit Street

Mishawaka, Indiana

What are your refractory castable problems

?

- High Temperatures?
- Abrasion and Erosion?
- Slag Attack?
- Overhead Applications?
- Insulating Properties Required?

B&W makes a wide range of specialized refractory castables. Whatever your problem, you will find helpful data in B&W Bulletin R-35. Send for your copy today.

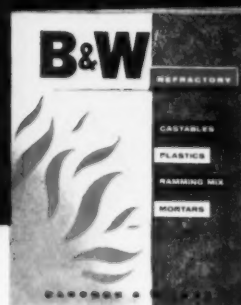
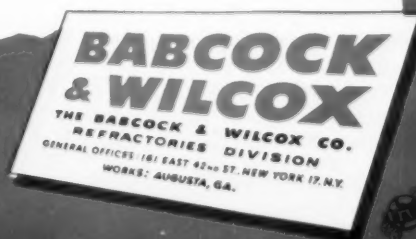


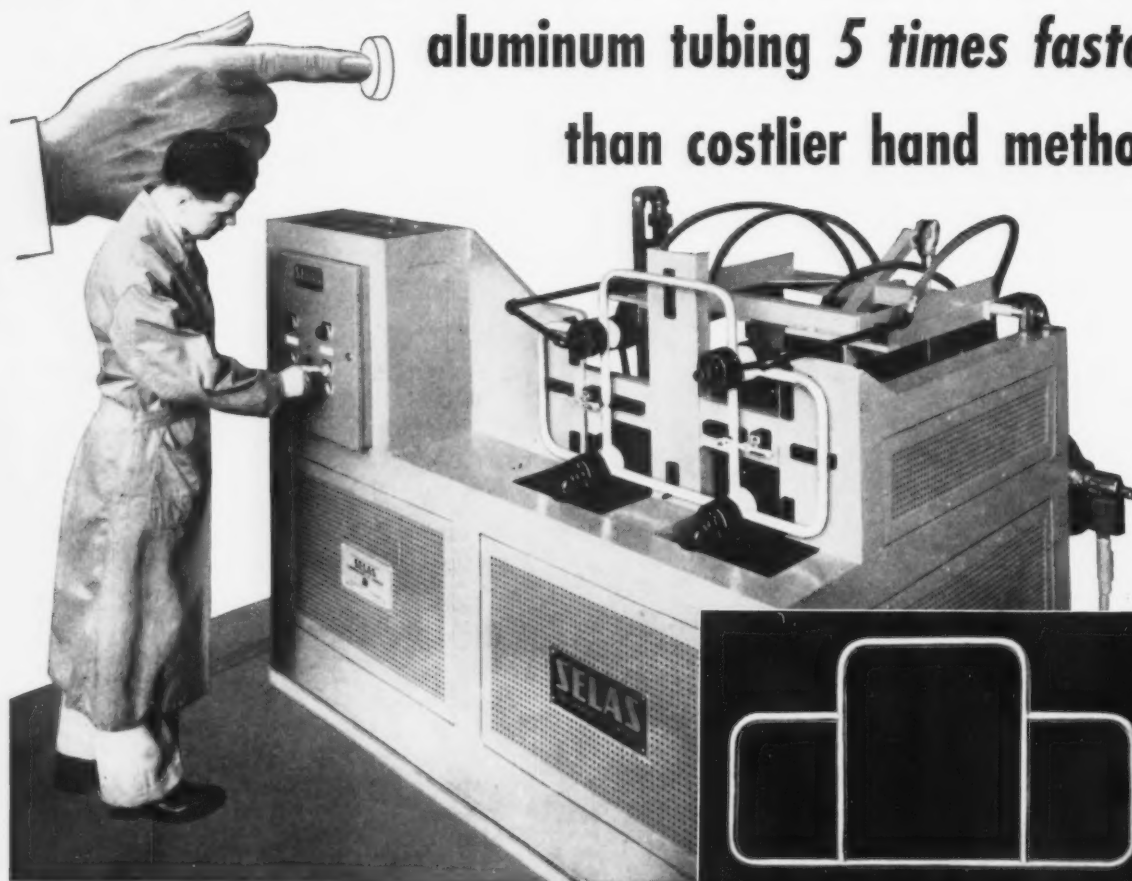
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B&W REFRACTORIES PRODUCTS: B&W Allmetal Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide



PUSH
the BUTTON... and this SELAS machine brazes
 aluminum tubing *5 times faster*
 than costlier hand method



Four joints of aluminum bedframe section are brazed simultaneously at rate of 25 complete assemblies per hour. Automatic cycle: burners move into position, high fire, low fire, standby for cooling, burners retract. Previous hand method, requiring high labor skill because of narrow temperature margin between workpiece and aluminum filler, turned out only 40 assemblies per day.

On pioneering projects . . . or in improving routine joining and assembling operations . . . Selas simulates your production conditions in the research laboratory and brazes the actual workpiece. Then, fully-automatic or semi-automatic brazing machines are custom-engineered, custom-built to meet your specific requirements.

You get speed, versatility, reproducible uniformity, because Selas *builds the skills* into your machine. And, because Selas designs, constructs, starts-up and services each machine, problems usually associated with divided responsibility are eliminated.

Send for Bulletin 14 "Production Brazing and Soldering," and reprints "Gas-fired Machine Brazing" and "Mechanical Heating puts Brazing on the Production Line."

SELAS
 CORPORATION OF AMERICA
 DRESHER, PENNSYLVANIA

Heat and Fluid Processing Engineers
 DEVELOPMENT • DESIGN • CONSTRUCTION





Scott Wipers are used for many wiping jobs at Allen-Bradley Company. Here a drill press operator cleans grease from the decimal scale. When used fresh from their "pop-up" box, these paper wipers carry no metallic particles to hurt workers' hands, or damage machines or parts.

WIPER PROBLEM? Look what Allen-Bradley did with Scott Wipers!

High laundering and replacement costs of cloth wipers were a problem in the Milwaukee plant of Allen-Bradley Company, a major manufacturer of motor controls and accessories. Several years ago, Allen-Bradley switched to Scott Wipers. Costs were reduced substantially, and workers appreciated the change to these disposable paper wipers.

Allen-Bradley uses Scott Wipers in various machine tool operations involving large drill presses and grinders, sanding machines, tapping and small drilling machines. Scott Wipers

efficiently clean oil coolants from machines and parts. Operators especially like Scott Wipers for wiping oil from their hands—when used fresh from their "pop-up" box they are sanitary and carry no metallic chips which might cut or scratch.

Scott Wipers are 2-ply paper, chemically treated for wet strength and "perf-embossed." This exclusive process* makes them soft and highly absorbent. Want details? Phone the Scott distributor or write Scott Paper Company, Dept. 1A-73, Chester, Pennsylvania.

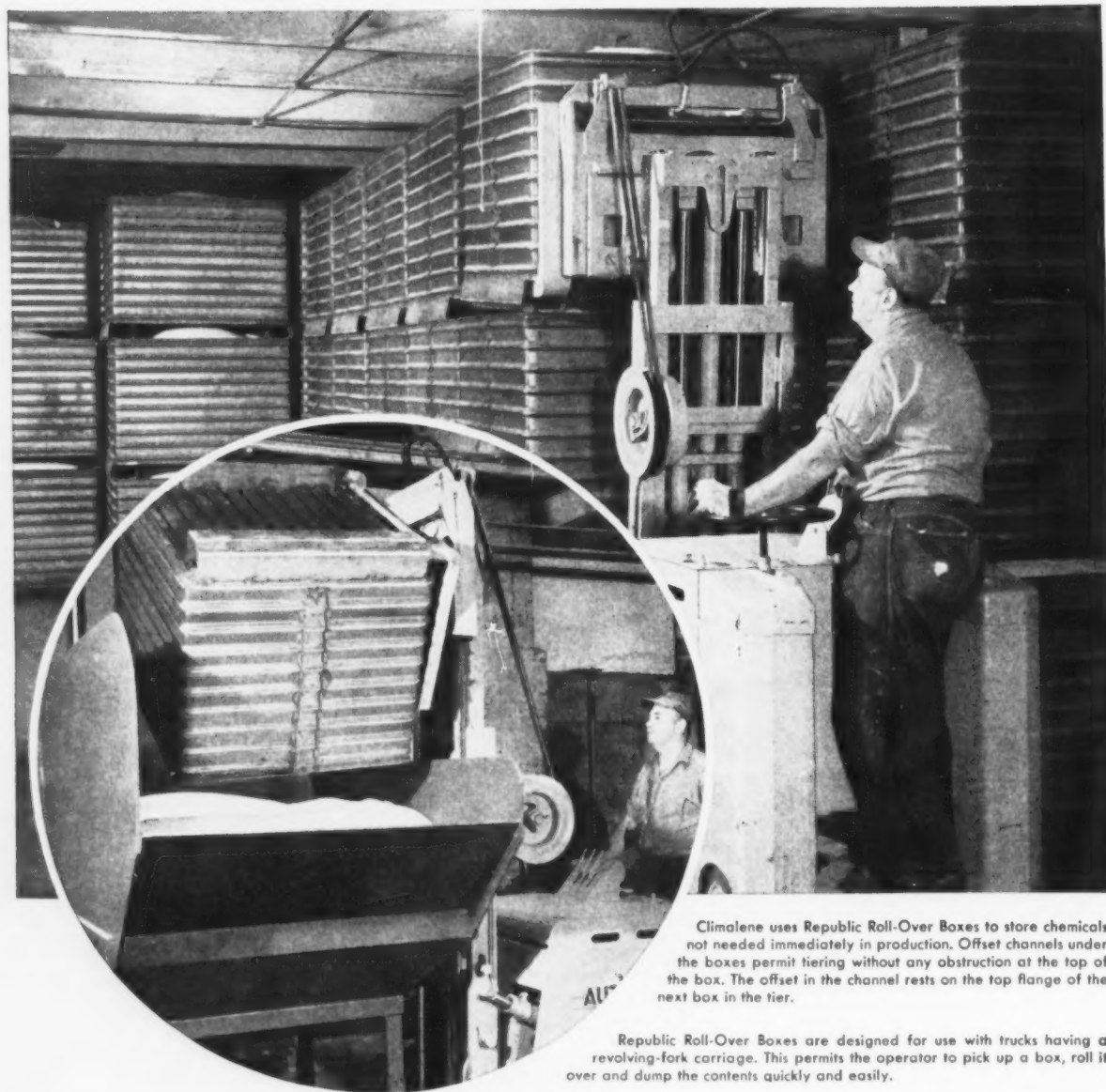


SCOTT PAPER COMPANY

Makers of the famous Scott paper products you use in your home.
Consult your local TV schedules for Scott's program, "Father Knows Best."

*Patent pending

HOW TO SPEED HANDLING, CUT COSTS, SAVE MAN-HOURS,



Climaflex uses Republic Roll-Over Boxes to store chemicals not needed immediately in production. Offset channels under the boxes permit tiering without any obstruction at the top of the box. The offset in the channel rests on the top flange of the next box in the tier.

Republic Roll-Over Boxes are designed for use with trucks having a revolving-fork carriage. This permits the operator to pick up a box, roll it over and dump the contents quickly and easily.

REPUBLIC



World's Widest Range of Standard Steels

REDUCE LOSS, SAVE SPACE

CLIMALENE COMPANY DOES IT WITH THE HELP OF REPUBLIC ROLL-OVER BOXES

The Climalene Company's Chicago packaging operation is proof of the savings that can be attained when materials handling equipment is engineered for the job.

Originally, chemicals used in the manufacture of Climalene were received in 100-pound bags in box-car quantity. Unloading one car and delivery of the bags to the mixing room required the services of five men and consumed six man-hours of time. This did not include the subsequent time required to open the bags and dump the contents into the mixing bins.

Then, because of a production increase, Climalene switched over to bulk shipment, receiving the chemicals in 60-ton hopper cars—giving a substantial saving in bags and bag disposal. This presented an entirely new handling problem. Republic Materials Handling Engineers were contacted and helped work out a sift-proof, bulk-handling system that is both fast and economical.

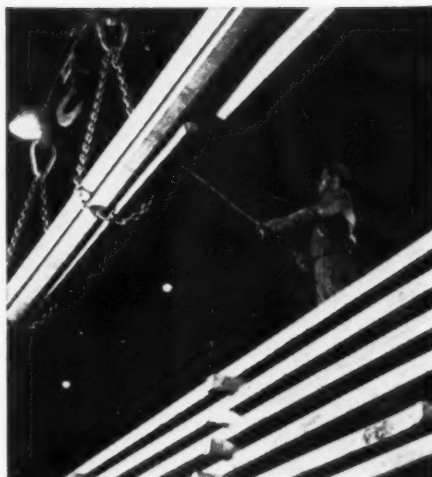
This new system, built around the use of Republic Roll-Over Boxes, provides these cost-saving advantages:

- (1) One man using Roll-Over Boxes can now unload a complete car in considerably less than half the man-hours required under the old system, providing a substantial yearly savings.
- (2) When used in combination with fork trucks having revolving carriages the boxes can be rolled over and the contents dumped, thus saving several handling steps.
- (3) Design and construction features of Republic Roll-Over Boxes permit tiering to any practical height, thereby saving floor space.
- (4) Chemical loss caused by bag breakage is eliminated.
- (5) The bag-disposal problem is eliminated.

What about your plant? Perhaps a specially engineered or standard unit could cut your costs or simplify an operation. Why not talk over your problem with a Republic Engineer? There's no obligation. Contact the nearest Republic Materials Handling Representative. Or send us the coupon.

STEEL

and Steel Products



SPEED HANDLING of heavy materials, like bar stock, with Republic Chain Slings, Attachments and Accessories. All Republic Chain Slings are proof tested and warranted to meet or exceed specifications. They provide an exceptionally high degree of safety. Republic's Bolt and Chain Division makes chain slings in Alloy Steel, High Test Steel and Wrought Iron. Republic Chain Engineers are always available to help you select the proper chain for your particular requirements.



SAVE SPACE and simplify palletizing and stacking of bulky, uneven, odd-lot and fragile materials with Republic Steel Pallet Racks. Tubular steel supports adjust every six inches to handle palletized material of any height. Two-way entry permits loading and unloading from either side. Select single pallets from any level without restacking. Write for complete description, specifications and quotations.

REPUBLIC STEEL CORPORATION

Dept. C-3349
3104 East 45th Street
Cleveland 27, Ohio

☐ I am interested in more information on Materials Handling Equipment.

☐ Have a Materials Handling Engineer call.

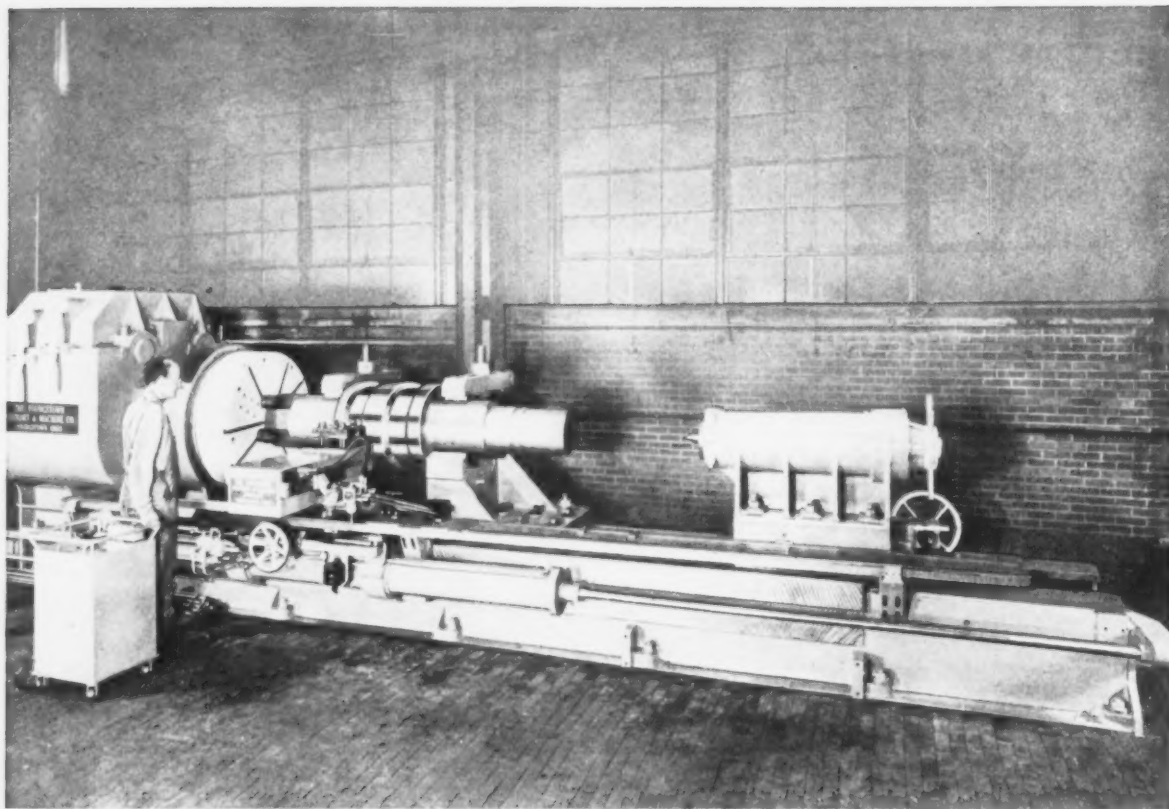
Send additional information on: ☐ Chain Slings
☐ Pallet Racks

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____



New 36" contour roll lathe can turn parts on necks or centers . . . cut with single point carbide tools or with regular roll turning tools. Speeds

range from .75 to 53.4 RPM. All heavy cast sections are ductile iron. Built by Youngstown Foundry and Machine Co., Youngstown, Ohio.

Ductile iron specified for heavy castings in new roll turning lathe

Today's machinist demands precision plus ruggedness in a roll turning lathe.

To meet these demands in its new 36" contour model, Youngstown Foundry and Machine turned to ductile cast iron for the lathe's four major castings.

For the face plate . . . ductile iron provided strength, toughness and wear resistance . . .

For the head stock . . . high strength along with good damping capacity . . .

For the tail stock . . . strength and toughness . . . a high modulus of elasticity . . .

For the carriage . . . high rigidity and strength.

Ductile cast iron provided these higher proper-

ties plus superior castability and machinability. That's because ductile iron combines certain advantages of steel and gray iron.

What about ductile cast iron for your application?

You may find ductile iron's combination of higher strength levels and good casting and machining characteristics will answer your design needs.

Why not find out how ductile cast iron can improve your product . . . save you production time and money.

Send for your copy of "Ductile Iron: The Cast Iron That Can Be Bent." It's packed with useful data.



ductile iron . . . the cast iron that can be twisted and bent

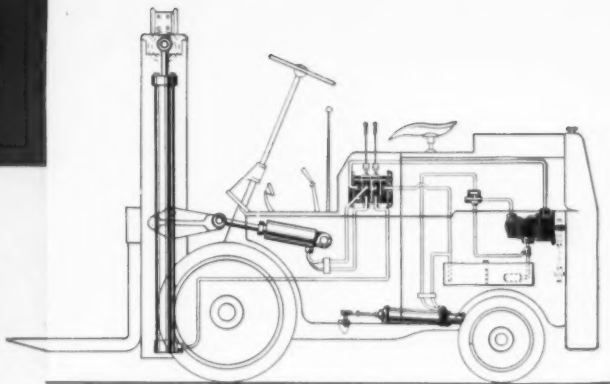
The INTERNATIONAL NICKEL COMPANY, Inc.
67 Wall Street, New York 5, N. Y.

VICKERS

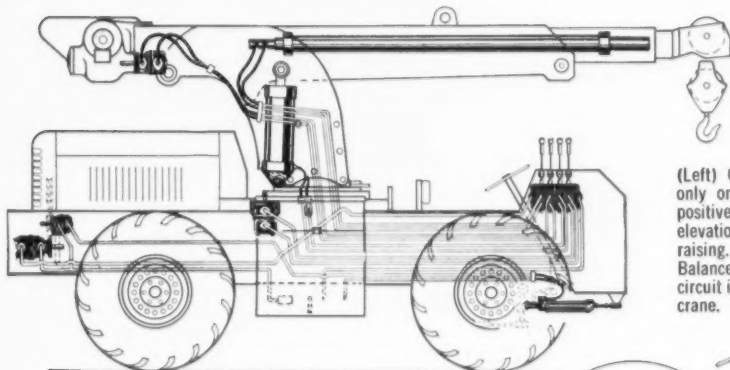
HYDRAULIC SYSTEMS

**Designate Superior Materials
Handling Equipment**

"Nobody sets a diamond in a brass ring." And when a manufacturer of materials handling equipment uses Vickers Hydraulics, it is indicative of superior quality throughout. To the inherent advantages of hydraulic control, Vickers adds the benefits of a nation-wide and full time field engineering and service organization of unequalled experience. Vickers has the complete line of hydraulic equipment necessary to take undivided system responsibility . . . to eliminate any risk of incompatibility of hydraulic components. For further information, ask for new Bulletin M5101A.

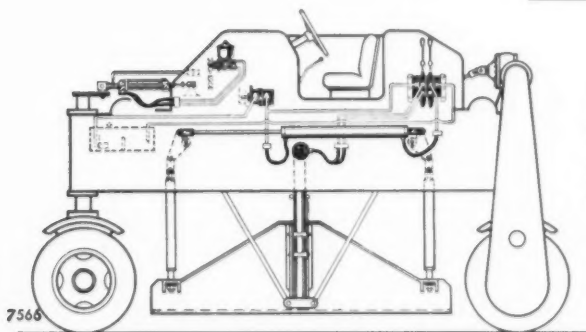
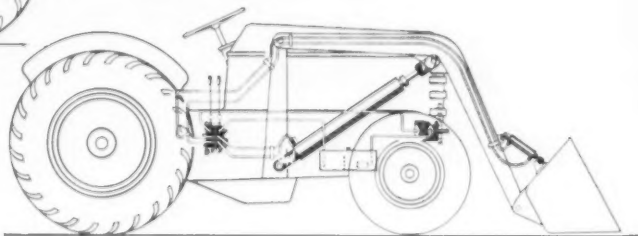


(Above) Fast tilting and lifting are possible along with exclusive "feathering" ability. Also, fingertip power steering permits operator to maneuver vehicle with one hand and control loading operations with the other. Additional vehicle attachments can be hydraulically controlled by simply adding sections to existing control valve eliminating necessity of mounting separate valves.



(Left) One Vickers Hydraulic System (using only one pump) provides fast, smooth and positive: (1) turntable rotation, (2) boom elevation, (3) boom extension, and (4) load raising. Turntable is driven by a Vickers Balanced Vane Type Fluid Motor. Another circuit is used for power steering this hydraulic crane.

(Right) Fast, easy and dependable operation of front end loader depends upon Vickers Balanced Vane Pump and Vickers Two-Section Directional Control Valve. Automatic wear compensation is inherent in all Vickers Balanced Vane Type Pumps. Note simplicity of installation.



(Left) Straddle carrier uses hydraulic power to handle the load with precision and speed. Compact, two-section Vickers Multiple Unit Valve has double-acting valve for opening and closing load hooks and single-acting section for raising load. Separate circuit provides Vickers Hydraulic Power Steering.

**WRITE FOR
BULLETIN M5101A**

VICKERS INCORPORATED

DIVISION OF SPERRY RAND CORPORATION

ADMINISTRATIVE and ENGINEERING CENTER

Department 1420 • Detroit 32, Michigan

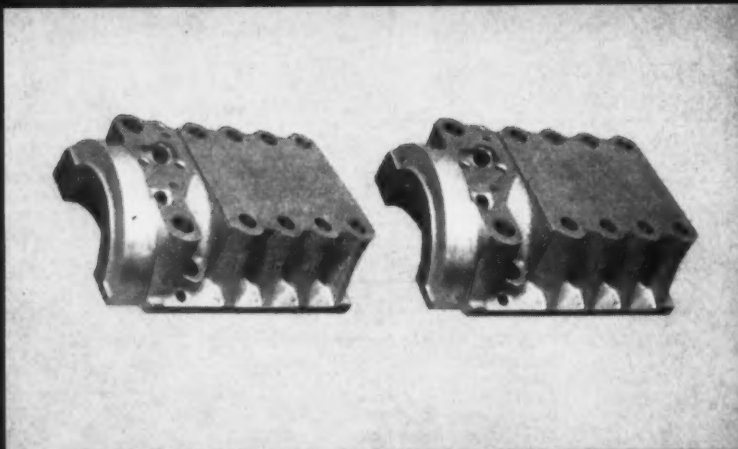
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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

THREE NEW DEVELOPMENTS

Increase Production

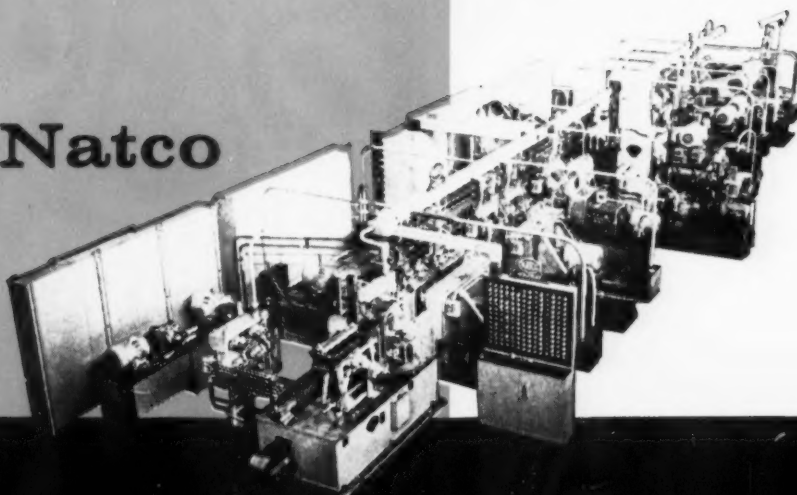
2-at-a-time processing



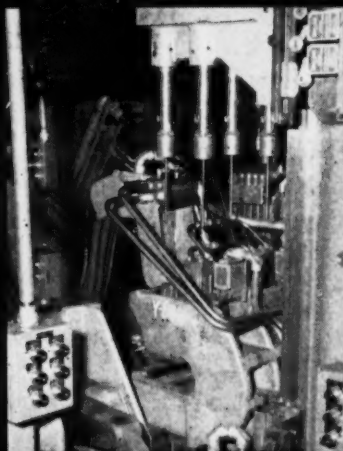
300 HP. Natco greatly increases production by processing two complete sets of bearing caps at once.

Bearing caps—240 *sets* per hour—six times the production rate of the machine replaced! This new Natco processes two complete sets at once. It loads surface-broached castings automatically, performs 80 machining operations, places matched sets of finished bearing caps on the assembly conveyor. In addition to broaching and sawing, this 300 HP, 27-station Natco, drills, reams taps, turns, mills, probes and faces.

help this Natco
600%

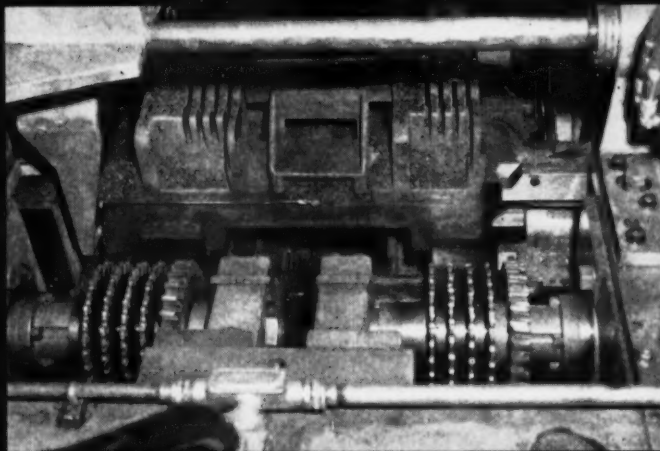


Unique Broaching Station



Fully automatic broaching station eliminates need for withdrawing broaching tools after cut. Broaching tools are pulled completely through hole, removing .030" stock.

New Rigid Saw Station



80 HP sawing station cuts two castings into complete sets of 5 caps each. All surfaces parallel within .0015". Fixture feeds castings into stationary mounted saws, providing rigidity for accurate 14 ipm cutting.

Whatever your high production problem, our engineers will work closely with your people to develop exactly the method and the machine to do your job best. Besides special way-type, index and transfer machines, Natco also builds multiple drilling, boring, facing and tapping machines. Call your nearest Natco office in Chicago, Detroit, Buffalo, New York, Boston, Philadelphia, Cleveland and Los Angeles. Distributors in other cities.

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**NATIONAL AUTOMATIC TOOL
COMPANY, INC.** *Richmond, Ind.*

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(Pay-As-You-Depreciate) Finance Plan*

WE RESPECT YOUR SPECIFICATION



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STAINLESS STEEL TUBING AND PIPE
GREENVILLE, PENNSYLVANIA



Wean, Fairless and Tinplate



*W*HEN U. S. Steel conceived the idea for their Fairless Works, they wanted the fastest, most modern lines possible. But, more important, they wanted equipment that would improve product quality.

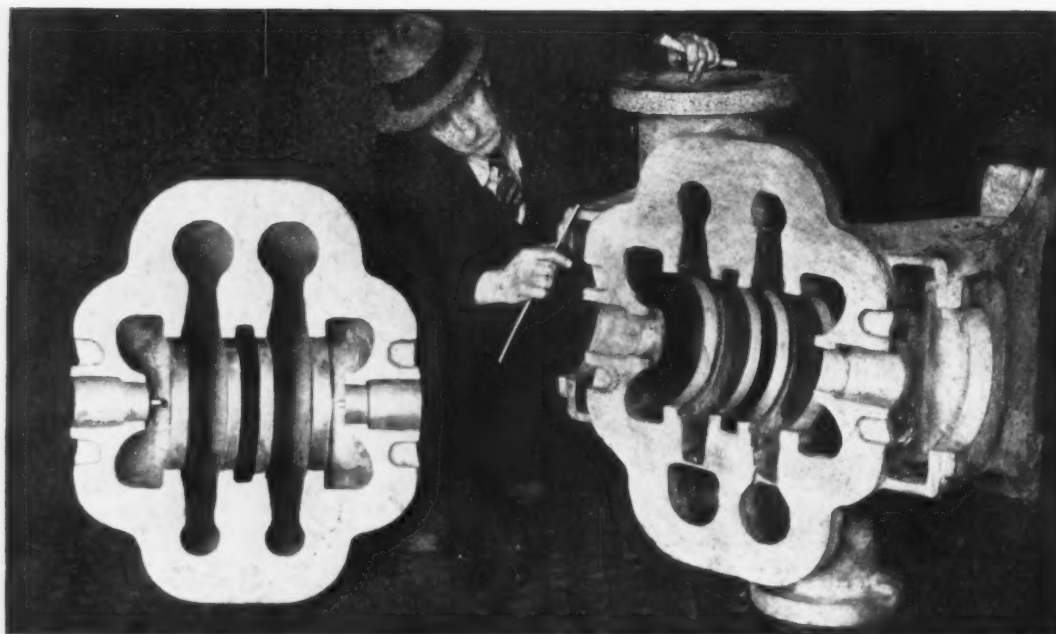
That's why, when they began thinking tinplate, they came to Wean — the world's foremost designer of electrolytic cleaning and tinplate equipment. In conjunction with U. S. Steel engineers, Wean produced a continuous tinplate line that has established records for both speed and product quality.

If you're thinking tinplate — remember 75 per cent of all tinplate produced by the electrolytic process is made on Wean engineered lines.

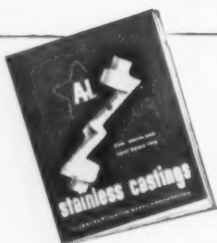


THE WEAN ENGINEERING COMPANY

WARREN, OHIO



There's NO problem in Stainless Castings that we can't answer for you—



Write for this book on A-L STAINLESS STEEL CASTINGS

28 pages of valuable and complete data on stainless castings: analyses, properties, technical data on handling and heat treatment, typical applications, how to order, etc.

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pioneers in both the static and vertical-centrifugal methods of casting stainless steels.

For your assurance, there's a long record of years of successfully answering difficult service conditions with sound, clean-grained Allegheny stainless castings—free from defects, easy to machine and dependable in supply.

● Let us quote on *your* stainless casting requirements . . . any size, any shape. *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.*

WSW 6533

Make it BETTER—and LONGER LASTING—with

Allegheny Stainless

Warehouse stocks carried by all Ryerson steel plants



Hoots Mon!

'tis a waste ta watch me
goin' through the air—



'cause 'tis

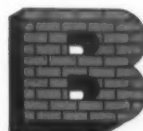
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Botfield

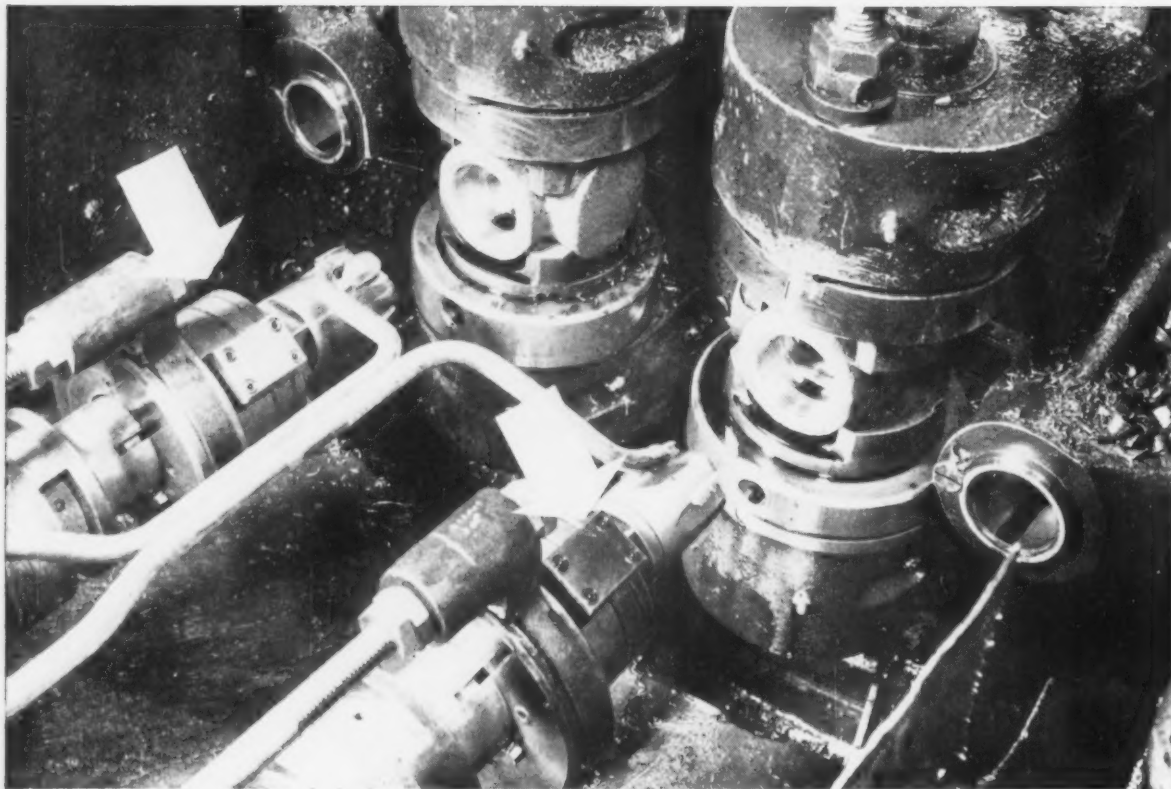
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Tapered threads

produced with *LOW* tool cost by receding *TAP*



"Receding action" enables the LANDIS LL Tap to thread 4000 W-S pipe fittings per grind at production rates to close tolerances.

This action produces a tapered thread of great accuracy because it mechanically withdraws the chasers from the work at a rate equal to the taper of the thread being produced. Cutting strains are reduced, a true conical thread produced, thread finish improved, and chaser life lengthened.

W-S pipe fittings are produced by the Watson-Stillman Fittings Division of the H. K. Porter Co., Inc. (Roselle, N.J.) for high pressure pipe lines. In the particular operation illustrated, two LANDIS LL

Rotary Taps on a special drilling and tapping machine are threading Forged Steel Pipe Elbows. 2" 11½ pitch ASTP threads are tapped at 35 s.f.m.—with 4000 threads completed between chaser grinds.

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For further information, send specifications and ask for Bulletin G-95.

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WAYNESBORO
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332-2



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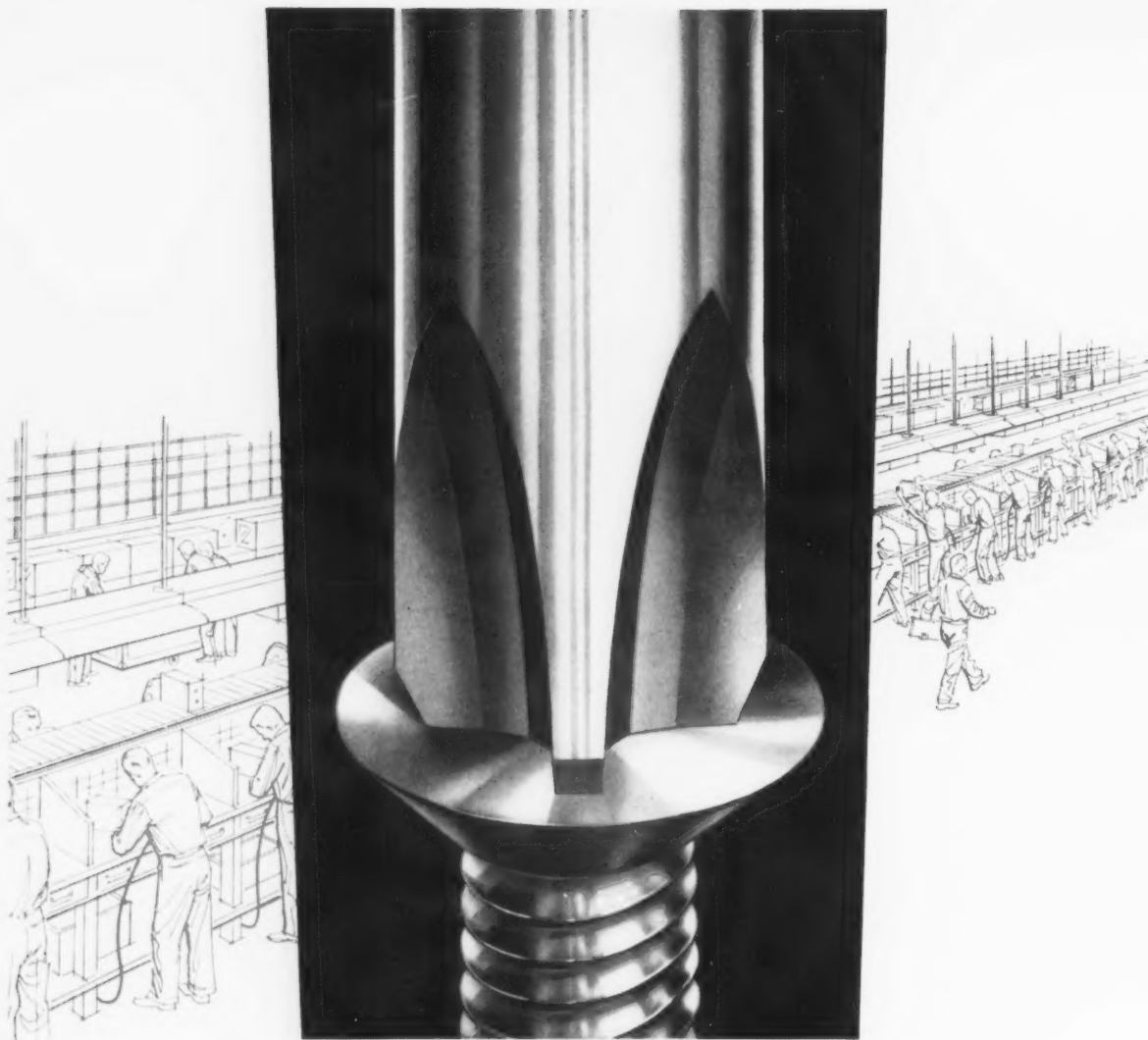


While the air-powered Signode stretcher holds the strapping at its one-ton tension, the workman crimps the seal with a Signode air-powered sealer. The seal, the strap—and the tension—will hold, to keep this 4900-pound bundle of steel bars tight and secure to destination. What material other than steel strapping could do this job, could take and hold this tension, would cost so little, could be applied with air power to do the hard work fast? This hefty bundle is a good example of how—and why—Signode can make your product cost less to handle, store, ship and receive. To be specific, call your Signode man, or write:

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You can usually break down fastening costs into 4 major factors:

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In some instances, local price fluctuations may appear to be worthwhile, but no one gives you more of all four major factors than American.

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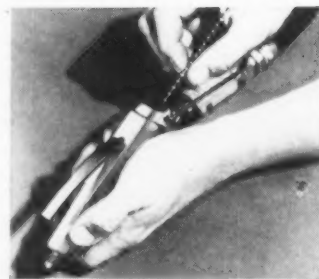
In Quality — where American offers you standards that set a new high for the Industry.

In Research — where American engineers have not only developed the universally accepted Phillips Head Fastener but have

produced such exclusive products as SCREWSTICK for industries with unique fastening problems. SCREWSTICK replaces the tedious handling of individual screws with automatic power driving, resulting in cost savings, exceeding 4 to 1.

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Make your own comparisons. Send us your inquiry for price and delivery or your specifications for special fasteners. Write:



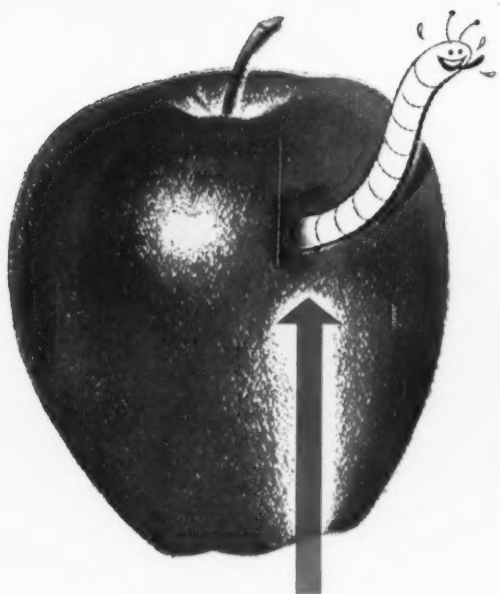
SCREWSTICK being loaded into air-powered driver



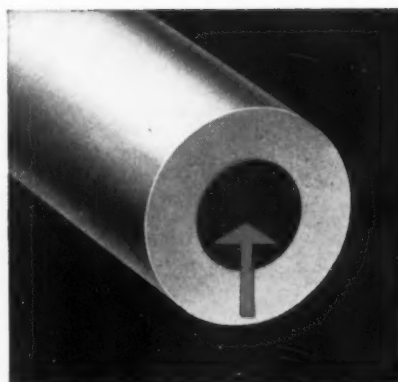
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a hole here makes waste...



a hole here saves waste

Crucible Hollow Tool Steels save waste — time and money — whenever you need ring-shaped parts or tools with a center hole. For the hole is in the piece when you get it! You eliminate drilling, boring, rough-facing operations — save machine capacity for productive work.

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Next time you have an application with a center hole, let your Crucible representative show you how these hollow tool steel bars can save you money and time. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

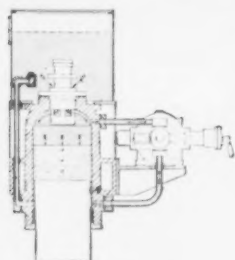
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first name in special purpose steels

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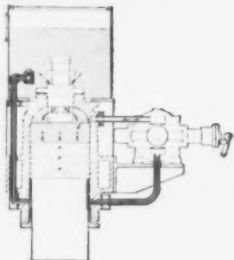
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HERE'S WHY H-P-Ms PAY OFF



Fastraverse Ram Advance

is controlled by rate pump; withdraws oil from supporting area. FASTRAVERSE prefill system augments oil to main cylinder from overhead reservoir during advance stroke.



Fastraverse Ram Return

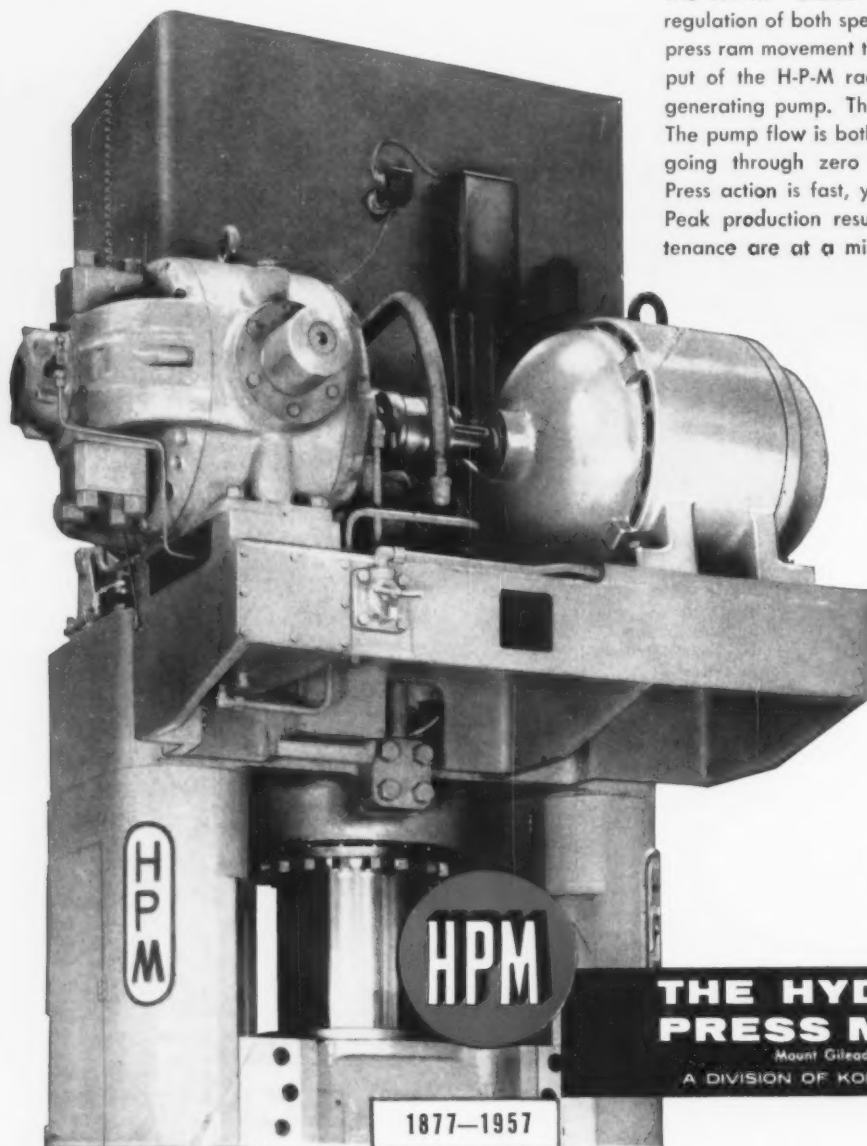
At reversal, pump delivers oil to supporting area by reversing direction of oil flow through pump. At this time, FASTRAVERSE prefill system opens and allows excess oil not handled by pump to be discharged back to tank.

FASTRAVERSE CLOSED CIRCUIT PRESS SYSTEM

Automatic Speed and Cycle Control

The H-P-M "Closed Circuit" system provides regulation of both speed and direction of every press ram movement through control of the output of the H-P-M radial piston type pressure generating pump. There is no reversing valve. The pump flow is both variable and reversible, going through zero at each press reversal. Press action is fast, yet smooth and shockless. Peak production results; idle time and maintenance are at a minimum.

Thousands of H-P-M FASTRAVERSE presses are in service today. Their dependability through performance is your assurance of satisfaction.



Write for complete
information Bulletin 5500

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PRESS MFG. CO.**

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1877-1957



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High-speed sigma welding a 5-in. thick alloy paper mill roll. Note top quality of multipass weld beads.

... SIGMA WELDING AND ALLOYED METALS

Because sigma welding joins modern alloys of varying types and thicknesses in fast, clean operations, it has gained recognition by manufacturers throughout industry as the most efficient welding process for a wide range of alloy fabricating jobs.

Combines Advantages

Sigma welding is an extremely versatile process—it joins metal alloys ranging in thickness from 0.035 inch to more than five inches (in multipass operations)—and attains up to four times faster wire deposition than other welding processes.

Gain the full advantages of modern sigma welding . . . Contact your local LINDE Representative for complete information, or write today for free literature.

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A Division of Union Carbide and Carbon Corporation

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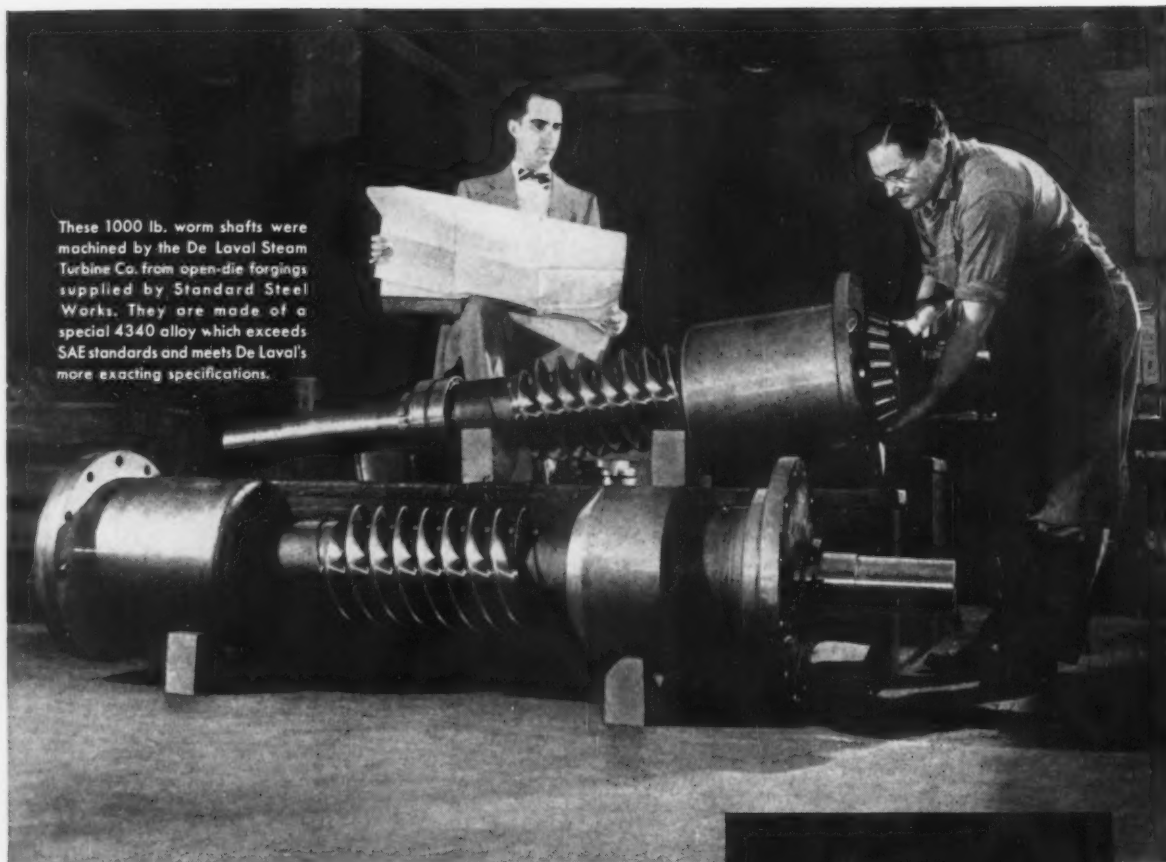
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Linde
Trade-Mark

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

These 1000 lb. worm shafts were machined by the De Laval Steam Turbine Co. from open-die forgings supplied by Standard Steel Works. They are made of a special 4340 alloy which exceeds SAE standards and meets De Laval's more exacting specifications.



"It used to take us 12 weeks to get the required forgings for these worm shafts. We now get them in 6 weeks —from Standard Steel Works"

We accommodate De Laval's Mr. Schwarz in two ways so as to give him the service he wants: (1) We keep ingots and billets of the special high quality steel De Laval demands on order point—we can meet even the largest requirements on short notice; (2) each forging is tested and inspected—the product of complete and precise quality control. Mr. Schwarz knows he can expect not only service, but also quality when he orders forgings and castings from us.

Mr. Schwarz is just one of many industrial executives who have been impressed with the extra service we enjoy rendering. Not a month goes by that De Laval doesn't come to us with some special request which we can meet, and cheerfully. And hardly a day goes by that one of our many customers doesn't put our boast of personalized service to the test. Why don't you let us handle your next forging or casting requirement. You'll appreciate our service as well as our know-how. Write Dept. 1C.



"It's not unusual for me to be invited out on the floor to talk with the men who are actually making castings and forgings for us. In my opinion it's the personal interest which the men at Standard take in a customer's order that lies behind the consistently excellent service they render," says E. T. Schwarz, Director of Purchasing, De Laval Steam Turbine Co., Trenton, N.J.

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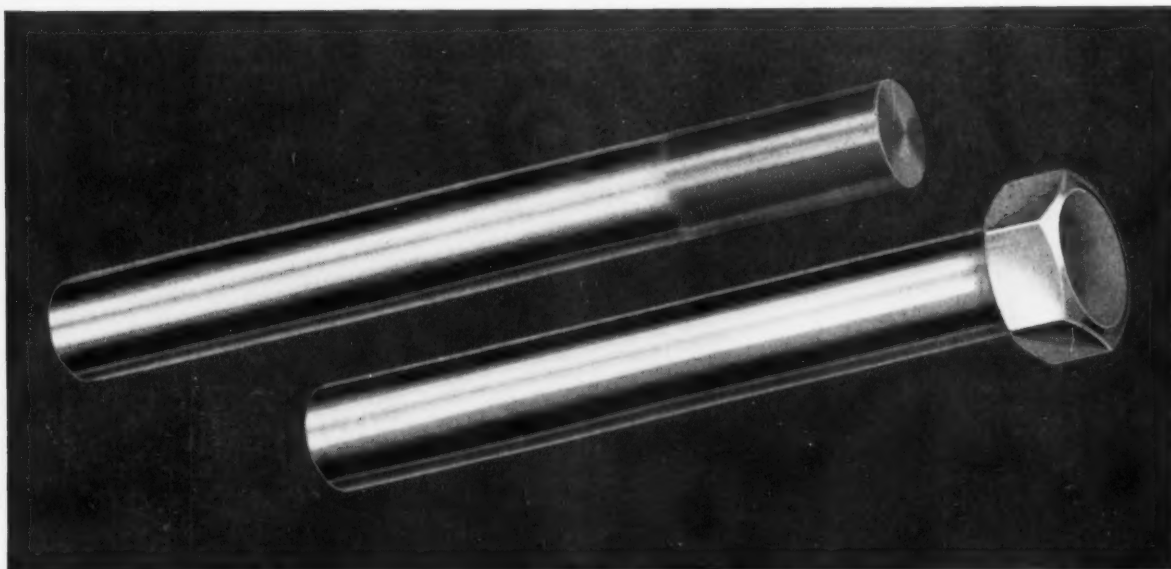


FORGING: COPPER • BRONZE • ALUMINUM • MONEL AND STAINLESS STEEL



Die Life Increased Up To 400%

with **TOCCO*** Induction Heating



● Naval Bronze, Silicon Bronze, Copper, Aluminum, Monel and all types of stainless steel are heated for forging at the H. M. Harper Co., Morton Grove, Illinois. Regardless of material TOCCO can be profitably applied to brazing, heat-treating and forging operations in almost any metal-working plant.

Production Up—In addition to the very important savings in forging dies, TOCCO has increased production to as much as 265% of output possible with former heating methods. On the 1" type 303 Stainless machine bolt blanks shown here TOCCO upped production from 75 to 200 parts per hour, using 35 K. W., 10,000 cycles.

Versatile—The same TOCCO machine is used on stock of $\frac{3}{8}$ " to $1\frac{1}{4}$ " diameter; heated zones vary from $\frac{1}{2}$ " to 4". TOCCO'S automatic timing cycles provide complete uniformity of heating throughout both length and cross section—assuring a uniformly high quality product.

Why not have a TOCCO Engineer investigate your plant to determine where TOCCO can cut your costs and streamline your production?



TOCCO

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Please send copy of "Typical Results of TOCCO Induction Heating for Forging and Forging".

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Company

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Available soon at lower prices . . .

A MILLION POUNDS OF ZIRCONIUM FOR INDUSTRIAL USE

By mid-1957 zirconium users can get 1,000,000 lbs. a year of the metal from a new U.S.I. Industrial Chemicals Co. plant at Ashtabula, Ohio. In a new, non-pyrophoric, non-hygroscopic platelet form U.S.I. zirconium has these advantages over the more familiar sponge metal: it eliminates safety problems in handling and shipping, and it permits a cleaner, safer melting operation.

Lower Price

Reactor grade will be priced at \$4.75 to \$6.50 a pound, depending on quantity. Commercial grade will sell at about \$1.50 less. These low prices will be possible because U.S.I., as a prime producer of sodium metal, uses a semi-continuous sodium reduction process—the most economical production technique ever developed for reducing metallic chlorides.

Higher Quality

U.S.I. zirconium will offer users top quality, too. In the first place, U.S.I. starts with sodium, a higher purity raw material than the reducing agents commonly used in other processes. Then, the technique itself yields a product of higher purity and uniformity. Finally, in making its zirconium platelets U.S.I. virtually eliminates chloride, magnesium, sodium and hydrogen impurities.

Small quantities of commercial grade material are available for immediate delivery. To help you on applications U.S.I. has a staff of metal experts. Call Bill Greenleaf, Manager of Metals Department, for further information.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers Products Corp.
99 Park Avenue, New York 16, N. Y.

Chemical Progress Week — April 8-12

Exclusive with the Heroult:

Operating Mechanism Independently Supported

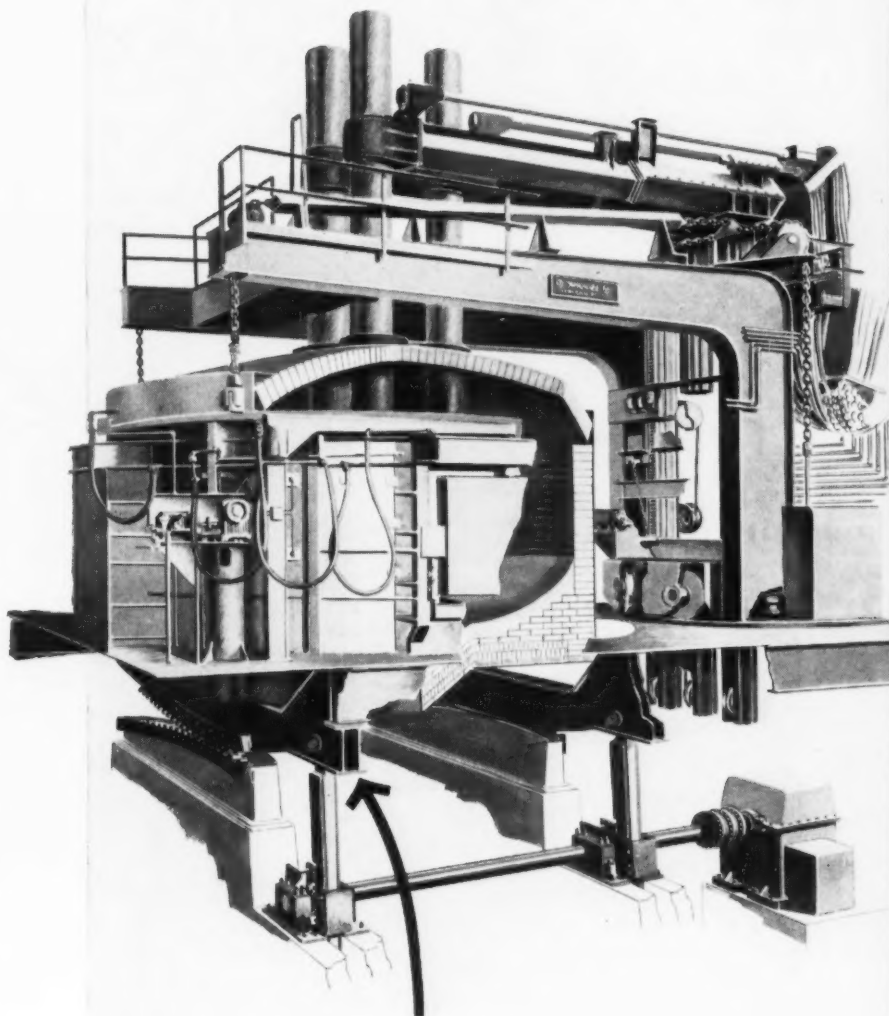
In Heroult's specially designed new furnaces the operating mechanism is located on the tilting platform, supported on rockers completely separate from the cage shell. In the event of shell warpage due to overheating, the mechanism remains unaffected and efficient production continues free from maintenance delays.

The independently supported operating mechanism which contributes to lower operating costs, and helps cut maintenance outlays to a fraction of former rates, is only one of the advanced design exclusives offered by the new Heroult for increased production efficiency. There are four others ready to operate on your behalf:

1. Flat-bottom shells, for simplified relining jobs and good bath temperature distribution.
2. Water-cooled skew back roof ring, eliminates need for special roof refractories.
3. Cage-type shell construction, minimizes shell distortion and facilitates replacement of damaged shell plates.
4. 100% mechanical operation, for reliability and ease of maintenance.

There is a wide range of new Heroult Furnaces with shell sizes from 7'0" up, and with capacities from 6000 to 400,000 pounds. You can obtain them with non-magnetic induction stirring equipment, top charge, door charge, and special duplexing. Non-ferrous furnaces are also available.

The pioneers and leaders in this field for 51 years, Heroult specialists in electric furnaces can help you select and install the equipment best suited to your current and future needs. Get in touch with our nearest contracting office—today—for complete information.



Heroult
ELECTRIC
MELTING FURNACES

AMERICAN BRIDGE DIVISION

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United States Steel Export Company, New York

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UNITED STATES STEEL

YOUNGSTOWN "BUCKEYE" CONDUIT

*... Provides Lifetime Wiring Protection
For Frank Lloyd Wright's
Modernistic Price Tower*



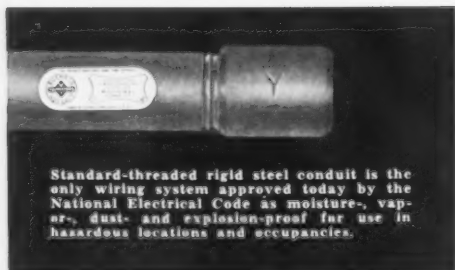
At Bartlesville, Okla., the H. C. Price Co.—veteran oil and gas pipeline construction firm—recently opened their beautiful, new cantilever-design Price Tower. Containing both offices and residential apartments, this 19-story, fully air-conditioned structure uses Youngstown "Buckeye" full-weight rigid steel conduit for protection of its important electrical wiring system from damaging elements such as water, moisture, vapor, dirt and dust.

Field reports across-the-nation state: "Youngstown's 'Buckeye' Conduit is easier to bend—easier to fish wires through and, due to its superior corrosion resistance, affords a much longer trouble-free service life."

Leading distributors in every industrial and electrical market are ready to serve you quickly and efficiently from their ample stocks of Youngstown "Buckeye" Conduit. They're as near as your phone—why not call today?



Price Tower, Bartlesville, Okla.
Owner: H. C. Price Co.
Architect: Frank Lloyd Wright
General Contractor: Culwell Construction Co.,
Oklahoma City, Okla.
Electrical Contractor: Industrial Electric Co.,
Oklahoma City, Okla.
Conduit Supplier: Westinghouse Electric Supply
Co., Oklahoma City, Okla.



Standard-threaded rigid steel conduit is the only wiring system approved today by the National Electrical Code as moisture-, vapor-, dust- and explosion-proof for use in hazardous locations and occupancies.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yaloy Steel
General Offices - Youngstown 1, Ohio
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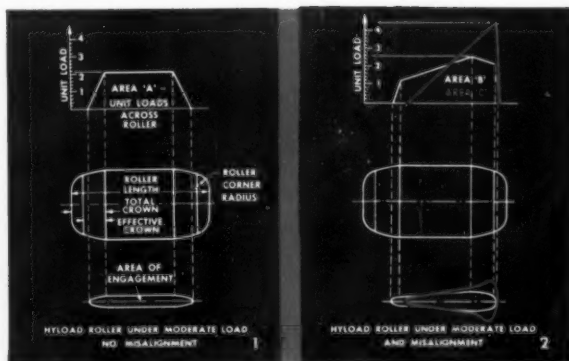
ONE OF A SERIES . . .

**What makes
Hyatts run
smoother
and longer?**

**PROPER LOAD
DISTRIBUTION
ON ROLLERS**

In any roller bearing, the design and quality of the rollers themselves vitally affect the performance of the entire bearing. The distribution of the load, both within the roller's area of contact and across the roller, must be expertly engineered. End-loading and conditions of misalignment can seriously reduce the life of a roller bearing. How HYATT minimizes these effects is detailed at the right.

You will find full selection and application data in HYATT Catalog 150, or call your nearest HYATT Sales Engineer. Hyatt Bearings Division, General Motors Corporation, Harrison, N.J., Pittsburgh, Detroit, Chicago and Oakland, Cal.



**ROLLER CROWNING MINIMIZES EFFECTS
OF BEARING MISALIGNMENT**

The unit load on any roller is distributed axially in a uniform manner except at the ends where crowning has been provided. Figure 1 shows how the unit load drops off to zero at the ends of the area of contact. The summation of unit loads represented by area "A" is the total roller load. This same load under conditions of misalignment (Figure 2) must result in an area "B" equal to area "A"; but the maximum unit load is considerably greater and the misaligned bearing will therefore have a shorter life. However, if the same total load is applied to an uncrowned roller in a misaligned bearing, as shown in red, a much higher unit load (area "C") results, which would still further reduce the life of the bearing. This demonstrates graphically why HYATT Hy-Load Series Bearings with roller crowning will run smoother and longer under conditions of misalignment.



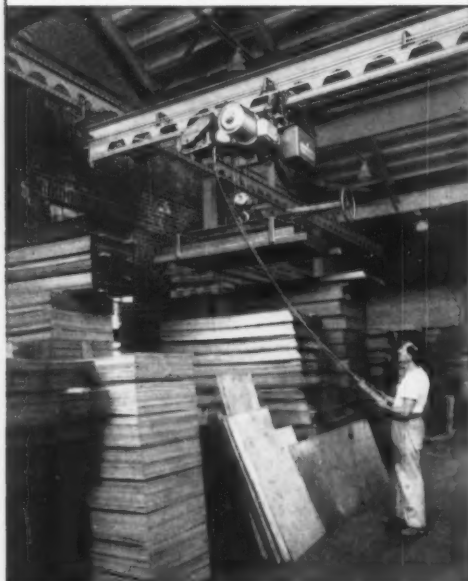
HYATT **HY-ROLL BEARINGS**
FOR MODERN INDUSTRY

TRANSFER CRANES **SIMPLIFY** Sheet Steel Handling



It is easy to maintain a neat, orderly warehouse with this 5000 lb. capacity completely motorized transfer crane system. (Many warehouses prefer 10,000 lb. systems which enable the handling of 5-ton packages of steel, unbroken as they come from the mill.)

No trick at all to pile the heavy sheets high with a Tramrail crane and hand-operated grab.



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TWO cranes on adjacent runways cut the cost of handling sheet steel in the modern warehouse of Eastern Steel Products, Ltd., Toronto. They enable one man to handle heavy packs quickly and make it easy to maintain orderliness.

The Tramrail System permits far more steel being stored in the building because it can be piled high and because wide aiseways required for floor conveyances are not necessary; thus, much of this space can be used for storage.

The overhead Tramrail cranes are always on the job, always within easy reach. They require extremely little maintenance, usually far less than needed for power-driven floor trucks. Further, there is no floor wear with cranes and this alone represents a considerable savings.

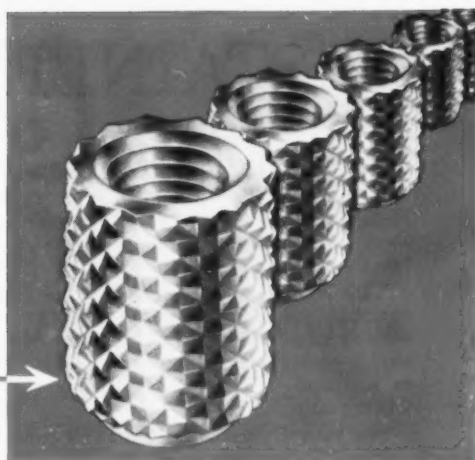
Being of the transfer type, the cranes may be interlocked with a common crossover track, permitting a hoist carrier with load being transferred from one crane to the other. Thus, loads can be delivered directly between any points covered by the cranes without in-between handling.



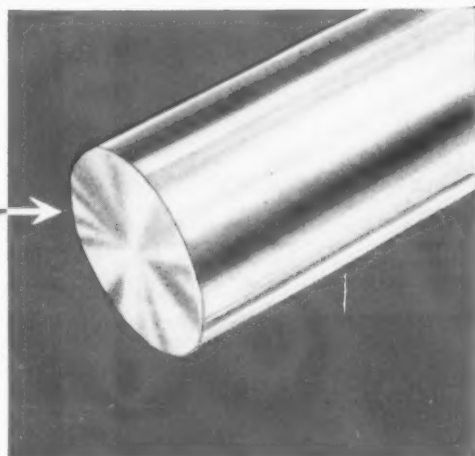
Overhead Materials Handling Equipment

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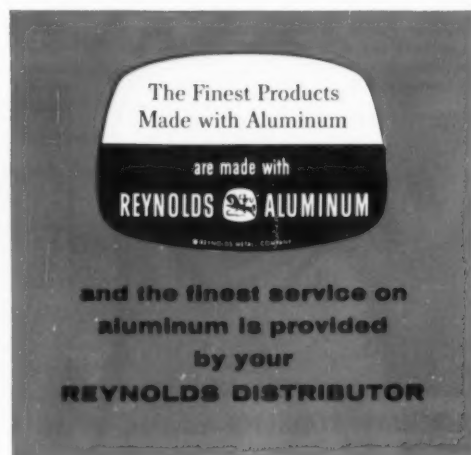
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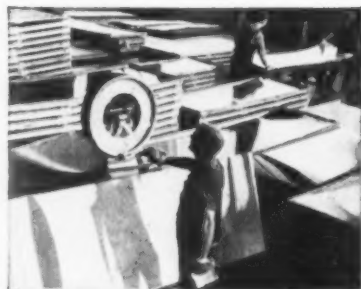
STAINLESS DIRECTORY

Buyers Guide to Ryerson Stainless Stocks & Services

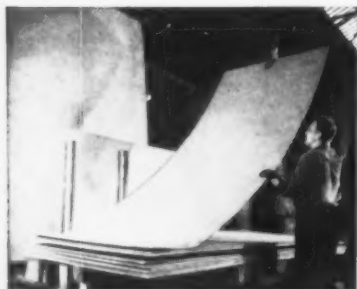
Here's a quick guide to the nation's largest stocks of stainless steel—2,351 sizes, shapes, types and finishes of Allegheny stainless in stock at Ryerson.

This wide selection assures you of getting the best stainless for every application. Extra care in storage, handling and shipping—such as padded shear clamps to protect finish and flatness of sheets—guards the high quality of Ryerson stainless stocks. And in addition, the help of full-time stainless specialists is yours when you call Ryerson.

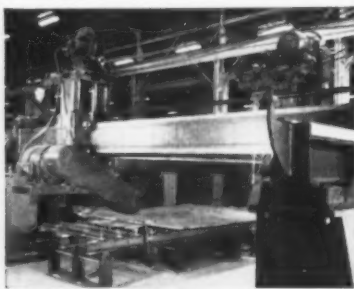
See your Ryerson catalog for a complete listing of stocks and call your nearby Ryerson plant for quick shipment of Allegheny stainless—one piece or a truckload.



SHEETS—11 analyses of Allegheny stainless sheets in stock including nickel and straight chrome types. Also extra wide sheets to reduce welding costs.



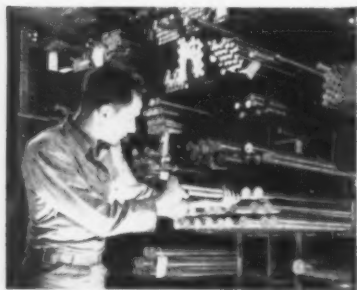
PLATES—Available in 9 analyses including plates to Atomic Energy Commission requirements and to ASTM specifications for code work. Also extra low carbon types for trouble-free welding.



TRUE-SQUARE ABRASIVE CUTTING
Stainless plates up to 12' x 25' cut absolutely square on abrasive disc machine. Length and width tolerance plus or minus 1/32".



A NEW STEEL—Type 202 Allegheny Stainless is available in 14 to 26 gauge sheets. Type 202 compares favorably with 302 in corrosion resistance; costs 2 1/4¢ per lb. less.



BARs AND ANGLES—Rounds, squares, flats, hex's and angles in 8 types including free-machining bars with both analysis and mechanical properties controlled for best performance.



CIRCLES, RINGS, SPECIAL SHAPES
—Practically any shape, no matter how intricate, can be accurately flame cut from stainless steel plate by skilled Ryerson operators.



PIPE AND TUBING—Light wall, standard and extra heavy pipe, ornamental and regular stainless tubing. Also flanged, screwed, welding and Quikple fittings and Cooper stainless valves.



AIRCRAFT STAINLESS—Sheets, strip, plate and bars to Government and Aeronautical Specs. Write for Ryerson Aircraft Steels booklet.

Principal products: Carbon, alloy and stainless steels—bars, structurals, plates—sheets and strip, tubing, reinforcing products, industrial plastics, machinery and tools, etc.

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Fresh Look At Tools?

Government interest in the machine tool and elephant tool program is being revived. New studies will try to bring defense requirements information and present capacities up to date. Indications are there are some deficiencies; new mobilization order (DM011V), stressing the short-war concept, may be used to further the buildup of these programs. Pentagon, Commerce Dept., Office of Defense Mobilization are all in on the new studies.

Watch Soaking Pits Soar

New soaking pits are playing a big part in steel expansion plans. To catch up with old needs, provide for new capacity as well, major producers are adding pits right and left. Current or recent installations for U. S. Steel alone include 37 rows and total more than 80 individual holes.

Cold Extrusion

Cold extrusion technology is advancing rapidly. One firm reports strongest aluminum alloys are now being cold-extruded in lengths to 60 ft, diams to 8 in., and with both internal and external discontinuous configurations as an integral part of tubular structures. On aluminum missile motor tubes now in mass production, concentricity ID to OD is held to ± 0.001 in., straightness to within 0.003 in. per ft. Close tolerances are readily met.

A Time For Decision

Federal Reserve Board members are trying to thrash out a Board position on whether the government should or should not have standby authority to control consumer credit. Some are for, some against it. FRB's year-long, five-volume (and another to come) study doesn't take a stand. Either way, FRB's decision will touch off a showdown battle in Congress, with Board's influence counting heavily.

Automatic Lube Systems

Managements seem to like centralized, automatic lubrication systems that never forget to lubricate important bearings. Sales of one leading system producer jumped 23 pct last year; are expected to rise another 30 pct in '57. This should help cut

nation's annual maintenance-and-repair bill. This is estimated at \$8½ to 9 billion now—about equal to total U. S. stockholder dividends yearly.

Vacuum Melting Studies

Extensive investigation is underway into vacuum-melted alloys for springs, bearings and valves. Properties of vacuum-produced low-alloy steels and superalloys are being studied carefully. Vacuum melting means few inclusions. Most metallurgists agree that one badly-needed tool is a satisfactory non-destructive test for inclusions.

New Type Planer

Metal is planed off in as little as one-fourth the time previously necessary, using a new type two-way planer. Planing of 10-ft longshear blades has been cut from 100 minutes to less than 28 minutes using carbide cutting tools. The two-way planer is taking a ½-in. cut on castings at 200 fpm; has cut planing time on jobs from previous 62 hours to 12 hours.

Easier Tubing Picture

More electric weld tubing in intermediate size ranges for the Southwest seems to be in the cards after May, since additional capacity for the grade appears to be coming in on schedule then.

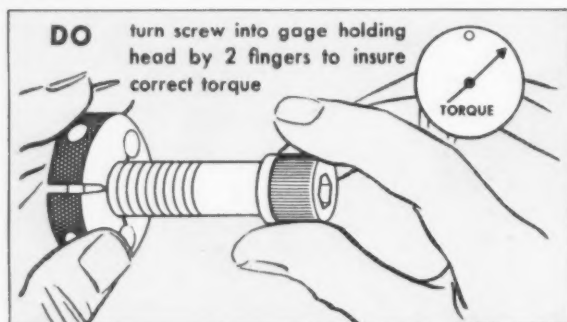
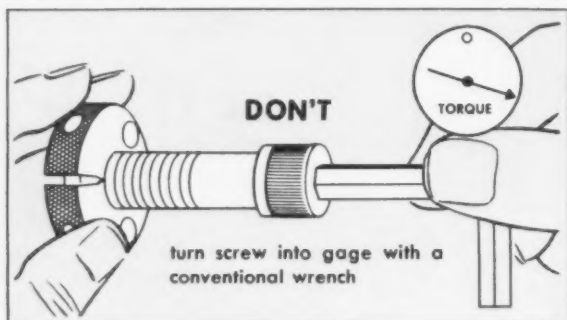
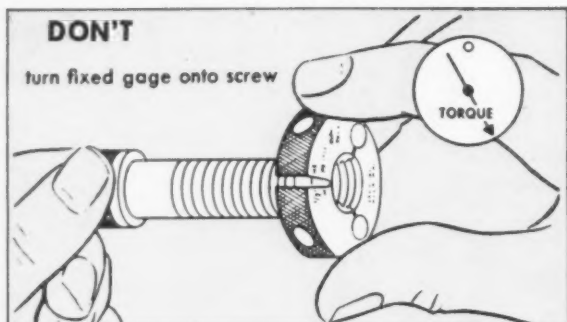
More Atom Problems Due

The atomic age promises to bring its share of new problems for metalworking plants. In order to work one radioactive material now, one company must first fence off the area around a press, provide special clothing for workers, then see that both equipment and clothing get scrubdown after the operations are completed.

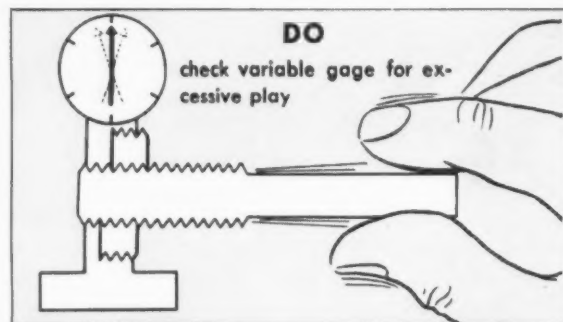
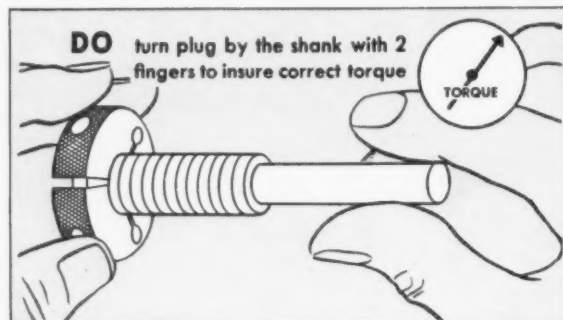
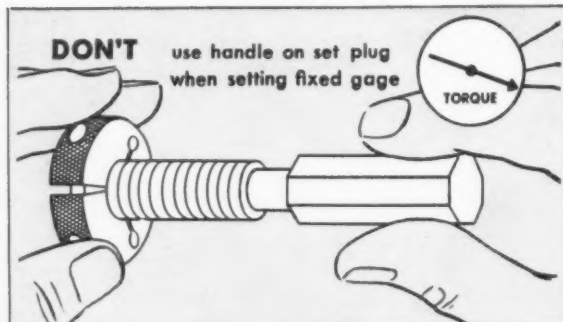
Tests Autos Indoors

Chevrolet has perfected an indoor proving ground which can duplicate all test run conditions at the regular GM proving ground. Heart of the system is an electronic programmer. Information fed into it controls a dynamometer which drives the parts to be tested. One advantage: Tests can be made without worrying about weather.

When measuring high limits



When gaging gages



These illustrations from new SPS booklet show some of the do's and don'ts of gaging precision threads.

3A threads: what they are; how to gage them — new SPS booklet tells all

Threads made to Class 3A fit are the most precise in general use in industry. But you do not always get the 3A precision you specify. Because of many different gaging techniques that yield varying results, screws with threads well outside the Class 3A tolerance limits often pass inspection.

SPS has prepared a new booklet on this subject. It explains clearly what Class 3A threads are and the pros and cons involved in the widely varying gaging techniques in use today. It reviews the gaging of high and low limits of 3A threads, sampling techniques, and even the methods of gaging gages.

All standard UNBRAKO socket screw products fall within specified tolerance limits *no matter what method is used to gage them*. Leading industrial distributors carry complete stocks. Unbraiko Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 17, Pa.



Form 2239, "Class 3A Threads: what they are; how to gage them." 16 pages, with many illustrations. Write for free copy today.

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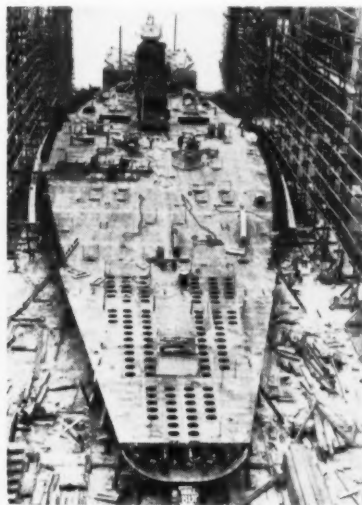
SOCKET SCREW DIVISION

STANDARD PRESSED STEEL CO.

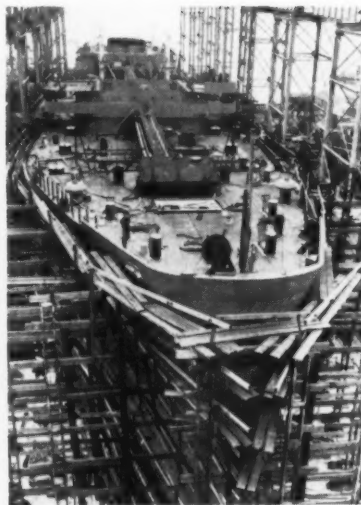
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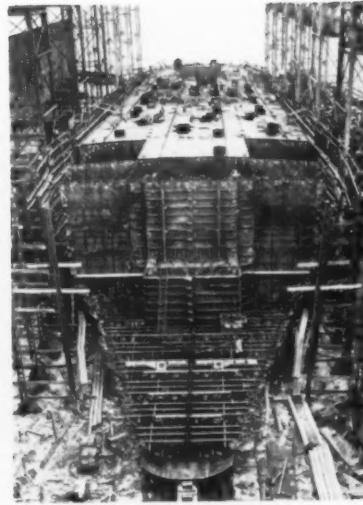
Sun Shipbuilding and Drydock Corp. Photos



ROLL-ON-ROLL-OFF: New type ships (left) to carry cargo for trucks



or railroads help boom U. S. shipyards. Suez crisis boosts construc-



tion of tankers like those on ways in center and right, above.

Shipbuilders Ride Crest of Big New Building Wave

Even More Business Looms Over Horizon

Present and foreseeable business will keep shipyards busy for years.

A \$3 billion dry-cargo program will build 300 new ships in next 6 to 7 years.

Shipping subsidy plays vital role in giving shipbuilders needed shot in arm.

■ Ready to crowd on the canvas, shipbuilders are confident enough to predict their business logs in advance. Trade winds are already brisk, and all the forecasts agree on even smoother financial sailing ahead.

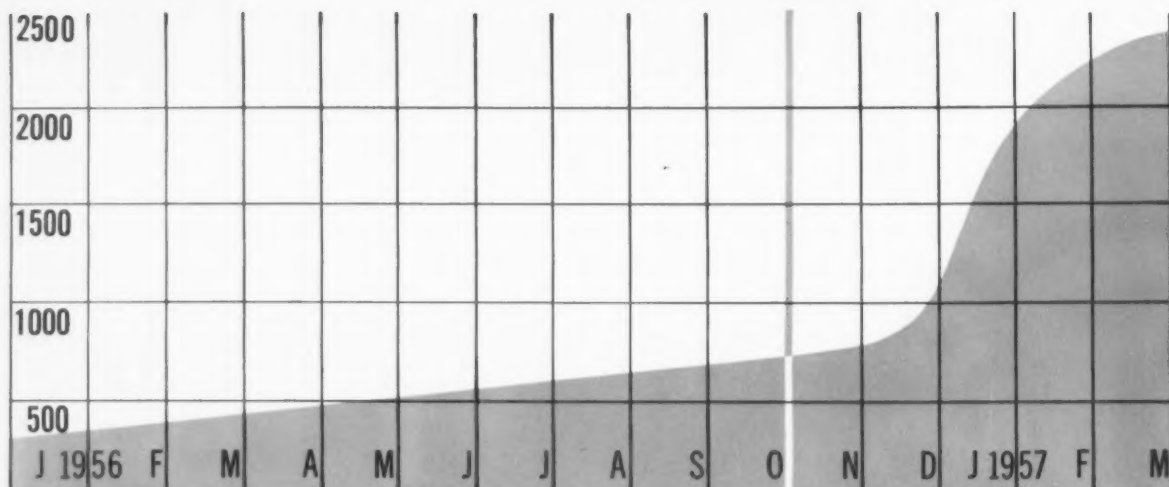
Business is good right now, but even bigger business looms on the horizon. Coming up is a \$3 billion dry-cargo freighter program that will mean about 300 new ships in the next 6 or 7 years. The business is not only guaranteed; it's required by the Maritime Act. And payment is copper-clad—40 pct of the total will be paid directly by the Federal Government.

Behind The Boom—This pleasant weather is a result of our complex, double-barrelled shipping subsidy machinery. Generally speaking, neither U. S. ship owners nor shipbuilders can compete in world markets because of high

costs—largely labor. To keep up our merchant marine (absolutely vital for defense), the government grants operating subsidies to American flag shipping lines. A main requirement for these subsidies is that ships be kept up to date.

American shipyards build the finest ships in the world, but at a price virtually no one can afford to pay. And a healthy shipbuilding industry goes hand in glove with a robust merchant marine. So the government reaches into its other pocket, pays additional subsidies for ship construction to bring the price of American ships into line.

For Example—Late last week, bids were opened on a sister ship



Activity Mounts in U. S. Shipyards

Gross Tonnage (in thousands) of Merchant Vessels Under Construction or on Order.

to the United States. Bids ranged from \$111,595,343 from New York Shipbuilding, Camden, N. J., to \$114,190,000 by Newport News Shipbuilding & Drydock, second lowest bidder; to \$119,934,000 from Bethlehem Steel's Quincy, Mass., yards; third and highest bidder. Complicating factor was length of time to build. New York Ship wants 1155 days from date of signing contract, Newport News 1090 days, while Bethlehem

couldn't promise delivery before Oct. 31, 1962. Bids must still be evaluated by the government before contract is awarded.

There is general agreement in shipping and government circles that a freighter is obsolete at the end of 20 years. Since virtually all the 300-odd cargo ships currently sailing for the 15 subsidized American flag lines were built during World War II, the lines now have only 6 or 7 years left in which to get new bottoms into the water.

When Payoff Begins—First ship to be built under the new program should be in operation by mid-1959. Maritime Administration plans call for a steady rate of 20 to 25 new dry cargo ships a year. Negotiations between the government body and the lines have been going on for some time, should culminate in contracts in the near future. As it stands now, 12 of the 15 subsidized lines are required immediately to build 172 new ships. And several non-subsidized lines have applied for operating subsidies to cover new or expanded services.

What Is Wanted—Legal requirements aside, most ship operators want new, larger, faster ships. Ship-

Suez Crisis

building costs will probably continue to go up, and foreign operators are grabbing for bigger slices of a hot world market. Dry cargo space is already so tight the government in recent months has authorized release of 200 vessels from the mothballed reserve.

But shipping firms are less and less attracted by the World War II fleet. Ship obsolescence is a real problem, which can show up painfully in operating costs. Higher insurance rates for older ships are particularly felt. And it's getting harder to run Liberty ships profitably. A similar situation arose in the 1930's with World War I Hog Islanders, for example, but the rebuilding program was delayed by a world-wide depression, then obscured by World War II.

New Ideas—Designs now being pushed are the Clipper, the Freedom, and the Seafarer classes. Pride of the fleet is the Clipper class, eyed to replace World War II's crack C-2 ships. The new ships will be sleeker, streamlined, designed for faster, more efficient cargo handling. Clippers will have a cargo capacity of 10,900 deadweight tons against the C-2's 9200 DWT. The Clippers' speed of 18 knots is significantly over the C-2's 15.5.

Legal requirements and direct subsidies are not the only needles



TANKERS: This 25,000-ton tanker at Sun Ship is ready for launching. It was constructed for U. S. Navy.

the government can give to a replacement program. Under new laws, Uncle Sam can insure 100 pct of a mortgage for up to 75 pct of a subsidized ship's cost. For non-subsidized ships the mortgage may run up to 87.5 pct of cost. Previously, the government could insure only about 90 pct of the mortgage.

What may be a marine revolution is coming as ship operators, after long study, begin the plunge into the roll-on, roll-off business. These ships are specially designed to carry pre-loaded containers which can be fitted to truck bodies. Enthusiasts claim they are the greatest thing in shipping since Robert Fulton.

Business And Pleasure — As a pleasant surprise, the passenger business is once again profitable for the first time in years. Several combination passenger-freighters are now being built under subsidy. And the chances for more are good. This type of ship is specially advantageous to the government, since for small extra cost defense features for wartime use can be included in the original plans.

In the meantime, U. S. shipyards aren't doing badly at all. The ship-building boom is worldwide. Some foreign yards are booked up until 1962, mainly in tankers. The American share in this boom is largely spill-over business that lower-cost foreign competitors just haven't been able to handle.

Tanker Program—Shipbuilders' Council of America reports highlight the current dependence on tanker orders. As of Mar. 1, U. S. yards have under construction or on order 103 major vessels with an aggregate deadweight tonnage of about 3.7 billion. Of these, 88 ships are tankers (including a few Navy orders and one wineship) with a deadweight tonnage of 3.6 billion. But for non-subsidized owners, American ships are a last resort. Until the new program, American yards will not have built a dry-cargo freighter for a private owner in almost 10 years.

Blast Furnace Goes Push-Button

Automating a unit that handles 6600 tons of raw material and 2000 tons of end product isn't easy.

However, Cutler-Hammer has done it for new blast furnace going in at Fairless.

■ Push-button controls are the new look for blast furnaces.

Following three years' design work and talks with steelmakers on their needs, Cutler-Hammer has come up with automatic blast furnace controls. Here's how the electronic system, scheduled for installation at U. S. Steel's Fairless Works, will operate:

A control console in the hoist house sets the charging pattern with the flipping of a few switches. Another control console at the scale house activates the actual charging cycle with the push of a button.

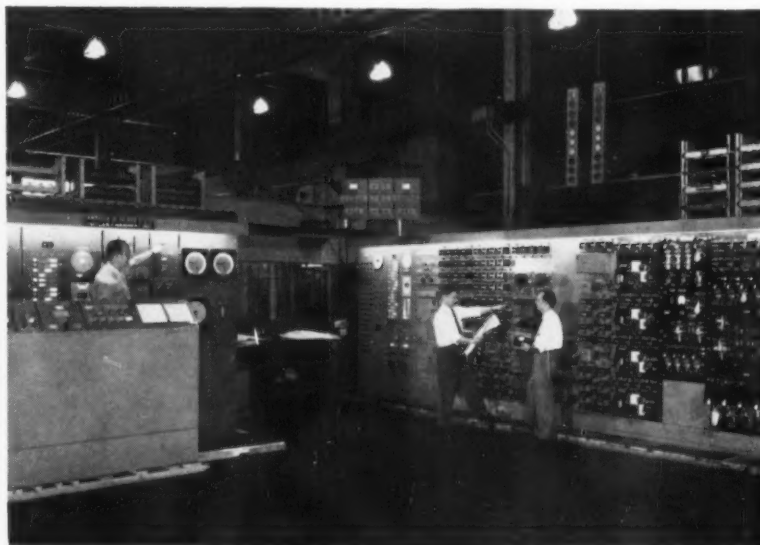
Get Facts—Console operators at

both locations know exactly where the charging skips are located, what they are carrying, how far the loading cycle is advanced, position of the stock rods, amount of charge carried on the large and small bells, and much more.

System was developed to meet the need by steel mills for pouring all necessary charging data into a central control point. Another aim was eliminating human error.

The Big View—As a result, the layout is designed to give both operators the best readability of the data. Here's what they might see: A charge of two skips of ore, one of limestone, and one of coke (repeated for two complete cycles) would show up on the board as two pink lights (ore), one yellow (limestone), and one blue (coke).

A traveling green light would indicate which skip (ore or limestone or coke) was moving up to the dump position; a meter would record the number of charges dropped.



ELECTRONIC ERA: Blast furnace operations at Fairless Works will be triggered by this automatic control center developed by Cutler-Hammer. All data needed for charging control is fed into one location.



Outboard Sales Top \$200 Million

Metalworkers can take a fresh look at the outboard motor market.

Trend to bigger, more powerful units means a fast growing market for metal products.

■ The well-oiled purr of the outboard gets a little louder every spring.

When the ice goes out this year, outboard manufacturers will be steering for 1957 sales of 700,000 outboard motors, worth about \$271.3 million at retail. This compares with 647,000 units in '56 valued at \$217 million.

Market to Envy—It's a market prospect that can scarcely be improved upon. There are an estimated 16 million outboard motor fans in the U. S., a number that grows yearly. They want bigger motors every year, more accessories per motor, and more motors for everybody. Throw in off-the-record reports of a replacement market that runs as high as 50 pct and you have what can hardly be called anything else than a bright future.

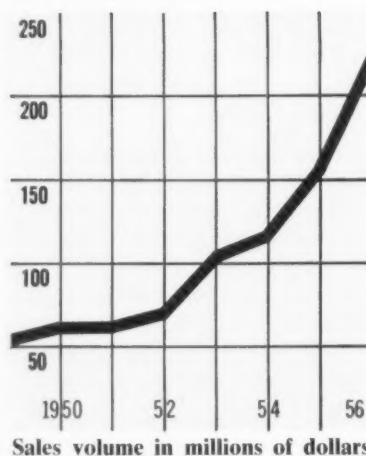
Metalworkers are justifiably eyeing that market with a selling gleam. The outboard motor industry will

this year consume nearly 13,000,000 lb of aluminum castings, much of it in fairly high tolerances; besides stainless and carbon steels, sheet steel stampings; non-ferrous castings; and a growing appetite for electrical equipment.

Trying for a Billion—The boom in boating has prompted Howard Lawson, sales chief for Evinrude, one of the largest of the outboard motor producers, to say that outboarding will become a \$1 billion industry in 1957.

This includes more than \$90,000,000 for marine fuels and lubes; purchase by consumers of substantially more than the 151,000 boat trailers last year; 700,000 motors of which better than 75 pct will be heavy-weights in the 7-35 hp classification, besides using more electrical starting and remote control equipment and other extras.

Centered in Midwest — Production of the outboard motor is strongly centered in Wisconsin, Illinois, Minnesota, and now Michigan with the strong advent of Oliver Corporation's recently acquired outboard motor division there. Despite the central location of the manufacturing end of the business, mar-



Sales volume in millions of dollars

keting is done mainly out at the corners of the nation—New York state, Michigan, Florida, and Texas; again, in about that order.

Outboard motors, after several years of study, have gone in strongly for shell mold castings. For instance, three years ago consumption of shell mold castings by the industry was negligible.

More Shell Molding — At the moment, plans are underway for at least a handful of the eight major and 11 smaller producers of outboards to build their own shell mold plants.

At the close of 1956 there were 4,740,000 outboards putt-putting over the lakes of the U. S. In spite of 400 pct ownership increase since 1947, there is absolutely no indication of any slowdown in consumer demand in 1957. This is despite the fact that the average price paid per motor has advanced from \$134 in 1947 to \$326 to 1956.

Wire Fabric Makers Gamble On Bigger Demand

Industry expects to bring in about 75,000 tons of new fabric capacity this year.

Hope roadbuilders will lead the parade to buy the increase.

Some break in the seasonal buying trend noted. Producers happy, hope the idea will catch on.

■ Welded wire fabric makers have more than doubled capacity in the last five years. And they're not finished yet.

Annual capacity of the nine major U. S. producers is now 700,000 tons. About 75,000 more tons will be brought in this year. In fact, expansion has been so rapid the industry is having temporary growing pains.

Reason for the surge: Big increases are anticipated in the three major markets, (1) reinforced concrete pipe, (2) reinforced buildings, and (3) roadbuilding.

Three of a kind—Concrete pipe and building markets are now about equal size, total about 80 pct of sales. Welded wire fabric for highways themselves, and culvert pipe to serve them is expected to about double, making the three markets comparable in size.

"The expanded roadbuilding program and economic growth of the country will eventually result in twice as much annual consumption of welded wire fabric as during the first 10 years since the end of World War II," says M. E. Capouch, construction material sales manager, American Steel and Wire Div., U. S. Steel Corp., Cleveland.

Besides the big highway increase, new peaks are expected in fabric for construction work and reinforced concrete pipe. Tilt-up con-

struction is booming welded wire sales. Slabs are poured in horizontal forms, then tilted up to make a wall. Sections of welded wire are made to fit the forms. In many cases they are displacing re-bars which must be cut to length and wired together.

Point Out Advantage — In the concrete pipe industry, a committee on welded wire fabrication of the American Iron and Steel Institute is conducting extensive tests to spell out the advantages of wire.

Sales for concrete culvert pipe are bound to follow roadbuilding. But welded wire faces stiff competition from vitrified clay and corrugated culvert pipe.

Although foreign competition is

heavy in other wire products, few wire fabric imports have crept into the U. S.

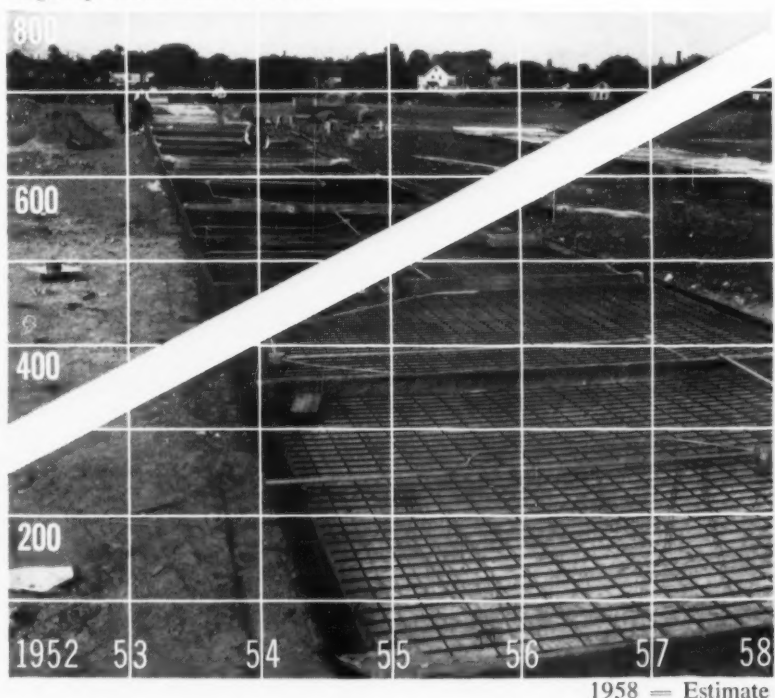
Growing pains are due largely to the fact that ordering still follows the seasonal construction industry.

Better For Fabric Makers — A slight break in the trend came this year when a few states placed orders in February (and paid for them) for delivery in May. This was welcomed by producers, who hope it will catch on. Now they lose workers in the off season, and must train new ones each year.

Fabric makers are paying about \$1.25 million for a new type welding machine. These units are not significantly faster, but produce a finer quality product.

Welded Wire Fabric on the Move

Capacity Thousands of Net Tons



Export Curb Hits Scrap Prices

Howls of Protest Come From Dealer Yards

When the U. S. suspended export licensing of heavy melting scrap, it started a stew.

At first it was thought the suspension would last about 30 days. Now it may go much longer.

The Dept. of Commerce, the State Dept. and foreign steel men are still in a huddle.

■ Clamor by the scrap industry over suspension of export licensing for heavy melting scrap grows louder. Just how much the Dept. of Commerce action hurts is becoming evident. It hurts bad.

Exporters are suffering most, of course, but one major offshoot of the suspension is it has kicked the prop out from under domestic prices.

"The only hopeful side of the domestic scrap market today is the possibility that licensing of exports will be resumed," said one port

dealer. "It would help firm the market."

Three More Weeks—Another cried wolf: "They've got no right to put a restraint on the scrap industry. There are 250,000 peddlers in this country who depend on scrap gathering for a living . . . the little scrap men are up on their hind legs."

When the Commerce Dept. suspension order went into effect Feb. 19, officials estimated some relief would be forthcoming in 30 days. But now it looks like the industry will have to wait at least three more weeks for definite word from Washington.

Embargo Seen—The suspension was reportedly based on a Battelle Institute study which showed a shortage of No. 1 and No. 2 heavy melting grades in the U. S. Congress appropriated \$50,000 for the study in May, 1956. By holding up shipments to Japan, Britain and the European Coal and Steel Community, the edict has the effect of

restricting shipments of all scrap grades.

According to Leonard H. Kreiger, president of the Institute of Scrap Iron and Steel, it is impractical for foreign buyers to take whole cargoes of lighter grades of scrap. Hence, the export movement will shortly become embargoed, he said. If no more licenses are granted by May 19, 1957, current licenses will have expired and scrap export will come to a standstill.

Back in Washington, the scrap industry has on its side one powerful agency—the Dept. of State. It has been putting pressure on the Commerce Dept. to continue scrap shipments to our allies. Still, there is no action on the diplomatic level, which is the important one at the present time.

Representatives of the Japanese and European steel firms have been conferring with Commerce and State Dept. officials. Outcome of these talks will probably be a voluntary agreement on how much ferrous scrap they will buy in 1957.

Why Freeze Hurts Scrap Trade

Insult to Injury—There's a big reason for the scrap industry's resentment at suspension of export licensing for heavy melting grades. It comes on a rapidly falling market.

Even before the action, scrap people were alarmed about the fast declining market. In three months of continuous decline, THE IRON AGE Composite Price declined \$17, from an all-time high of \$65.17 in December, 1956, to \$48.17 for March 19, 1957.

Worst Ahead—Only a fraction of the drop to date can be attributed to the export action. The market break first occurred, and was more serious, in the Midwest. Eastern

markets, bolstered by export, held comparatively firm and the rate of drop was far slower on the Coast.

But in recent weeks eastern prices dropped sharply. Now, with the added restraint on export, sharper declines appear inevitable. The trade is more bearish than ever over the prospect.

Price Comparison—Effective March 19, IRON AGE reported No. 1 heavy melting at \$51 to \$52 in Philadelphia compared with \$49 to \$50 in Pittsburgh and \$43 to \$44 in Chicago.

There are a few outward signs of a firming market in the Midwest. In contrast, there is little hope of

stemming the drop in the East with export hampered.

Mills Happy—While all this is causing fret and fuming in the scrap industry, steel mills are breathing more easily at the lower scrap prices. The inflated levels of late 1956 (and even the most optimistic scrap dealer knew it couldn't last) actually caused financial hardship to non-integrated mills that relied entirely on scrap. In some instances, mills pegged finished product prices on scrap prices.

How long will the market retreat last? As long as dealers are willing to sell at new, lower prices. There is little tendency as yet for dealers to hold scrap and attempt to bull the market.

A Multipress case study



Multipress, used here for staking chromium-plated pepper mill lids, saves 11¢ per unit for specialty manufacturer.

MULTIPRESS[®] saves specialty manufacturer 11¢ per unit

By using a Denison hydraulic Multipress equipped with simple interchangeable tooling, The George S. Thompson Corporation, South Pasadena, California, manufacturer of the Olde Thompson line of pepper mills and gourmet accessories, is now saving 11¢ on each pepper mill produced.

Previous methods for three sub-assembly operations cost the company 15¢ per unit. With the hydraulic Multipress, costs for these three operations have been reduced to 4¢ per unit. In addition to this significant cash savings, rejects have been virtually eliminated and production has been substantially increased.

The interchangeable fixtures on the index table permit the Multipress to be used for short-run jobs. Downtime for change-over is eliminated.

Learn how Multipress can reduce your production costs. Write Denison Engineering Division, American Brake Shoe Co., 1242 Dublin Road, Columbus 16, Ohio.

Write for Datalog
ASY-5 describing
this money-saving
method.



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How to "water down" a tough forming and machining problem

Is there a metal ductile enough to undergo severe right-angle forming and drawing without cracking? Can this metal be machine-threaded easily and economically inside—and outside, if necessary—after forming? Can all this be done on *our* machines, the way *we* do it?

These questions were asked by Ross Sprinkler Co., Rosemead, Calif., and answered by Bridgeport Medium

Leaded Brass Strip, Alloy #63, 12 B&S Gauge—a *standard* Bridgeport Alloy at a *standard* price. The result? The sprinkler head and accessories you see here—plus a lot of satisfaction and production savings.

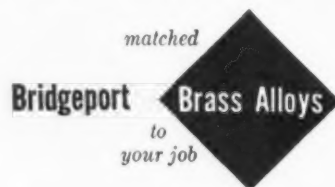
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requirements and product end use. Call your nearest Bridgeport Sales Office today.

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F. Price Norris, Jr.

Curiosity Makes the Salesman

The heights of success have been reached by those who sell through varied and devious routes.

Here is one man who travels an upward path plotted on firm convictions and experience.

One of the Commerce Department's top industry posts has been turned over to him.

■ When he was issued his first sales pad 33 years ago, F. Price Norris, Jr. thought all he needed was a sharp pencil and initiative to do the job. Looking back, he knows that he needed a lot more. And, apparently, he had it.

The reason the Dept. of Commerce named him director of the Iron and Steel Div., Business and Defense Services Administration, is found in his record at Allegheny Ludlum Steel Corp., where he is assistant to the vice president, sales.

Faster Communications — Mr. Norris is a driving force behind Allegheny Ludlum's movement to streamline its sales department. "Sales departments in industry," he says, "tend to lag behind the salesman. Our new system is designed to recognize basic differences between today's steel salesman—a scientifically trained college graduate—and the salesman of a few decades ago."

Today's salesman needs information fast, Mr. Norris explains. He needs a quick communications link with engineering, development, and production departments. As many a frustrated sales engineer will attest, orders can fly out the window while creaking home office ma-



F. Price Norris, Jr.: You must have a desire to help.

chinery bobbles requests for technical data.

Returns to Sales—Mr. Norris grew up almost in the shadow of Phoenix Iron and Steel Co. mill, Phoenixville, Pa., where his father once was vice president. During summer vacations the younger Norris worked in the mill.

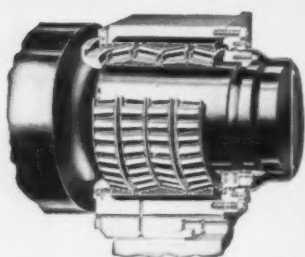
He started his selling career with Stanley Works, then received metallurgical training at Bethlehem's Sparrows Point yard, and returned to sales with Superior Steel Co. He joined Allegheny Ludlum in 1936.

He tried twice to "escape" the steel industry. Once in 1922-23 as a materials expeditor with a bat-

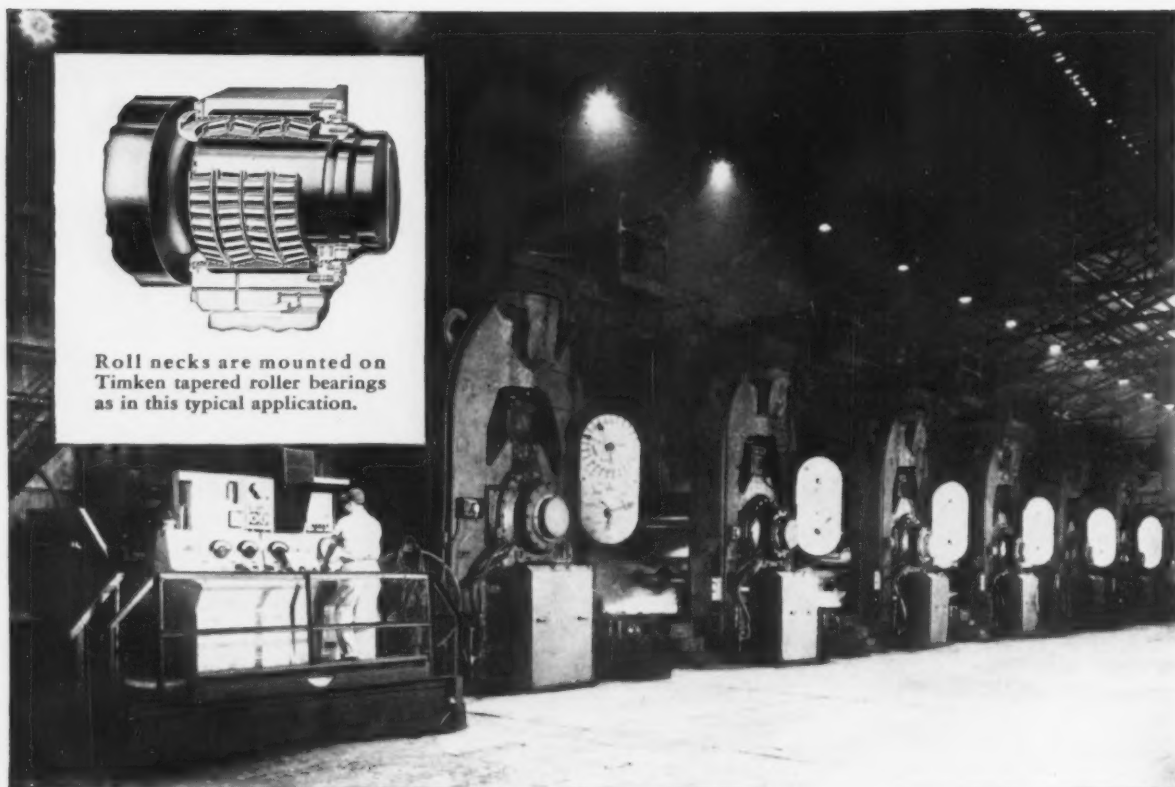
tery manufacturer, and again several years later as a Westinghouse employee.

Know Your Limit—When Mr. Norris tells you that "a successful salesman must have curiosity and a desire to be helpful," it is not just a casual remark. He believes these to be the missing links in many a would-be salesman's attitude. "A salesman must seek out a potential customer's problems," he states. "And then he must know what facilities his company has."

A six-month term with BDSA is another chance for Mr. Norris to practice his credo of "curiosity and helpfulness."



Roll necks are mounted on Timken tapered roller bearings as in this typical application.



New design TIMKEN® work roll bearings average 75% more tonnage than previous design on hot strip mill

TO take the loads of high speed production and reduce mill delays, a Midwestern steel mill installed a new design of Timken® bearings on the work rolls of its 4-high 80" continuous hot strip mill. By the end of 1955, production figures revealed that the new design Timken bearings averaged 75% more tonnage in the fixed position—where service is most severe. This increased tonnage came from increased radial and thrust capacity in these new bearings. The net result was a substantial reduction in bearing cost. And this new design made higher performance possible with no increase in space. It's another example of how Timken Company engineering can help cut costs and reduce mill delays.

These new design Timken work roll bearings are compiling amazing records because 1) Timken advanced engineering designed these bearings for the job. 2) They were precision-manufactured for longer life. 3) Their true rolling motion, made possible by the tapered design and smooth surface finish, practically eliminates friction. Performance records compiled by mill operators everywhere prove Timken work roll bearings provide minimum cost per ton of steel rolled.

So, to minimize mill downtime with correspondingly lower operating costs, be sure you specify Timken tapered roller bearings in the mill equipment you build or operate. Look for

the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means its bearings are the best.



TIMKEN

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TAPERED ROLLER BEARINGS ROLL THE LOAD

Road Program Is No Cure-All

Federal highway program was expected to be the answer for many big industries.

Slow to start bonanza is catching some equipment builders far off base.

■ Don't bet everything, all at once, on the new federal road building program.

It's still there, and will be there for years to come. But it isn't having all the desired effect on business that was expected for this year. It now appears that its real

effects will be felt not earlier than 1958. This is a lot later than original expectations.

Too Late for Some—For some, the expected bonanza is already embarrassingly late. One of the biggest makers of heavy equipment, one that would be a natural for the gigantic project, has already announced cutbacks for this year.

Whatever the reason, the big program is not getting off the ground as rapidly as expected. It could very well be the shortage of materials that is hampering the program. Not only steel, but other

products such as cement are holding the program back.

Better in '58—It was originally estimated that \$6.8 billion was to be spent this year by federal, state and local agencies. It now appears that no small part of this will be set back into 1958.

Here's an example: An executive of one top company in the equipment field reports its construction equipment sales are running 17 pct behind a year ago. He believes that very little of this year's highway spending will be directly related to the Federal program.

Look for a New Escalator Index

Buying Habits Change—There may be a new cost-of-living index.

Rising incomes and the trek to suburbia are creating new family buying habits. As a result, there's more than a suspicion that the government's index is getting a little out of line.

Both industry and government have heavy investments in the accuracy of the Labor Dept's price indexes. Your own company's wage contract, for example, may be tied directly to the Consumer Price Index.

300 Items—The Consumer Price Index (often referred to as the cost-of-living index) is based on prices of 300 items. Price changes are matched against the amounts of each item that the bureau believes the average family buys.

The Bureau last checked its index basis in 1951. It's fairly obvious that the pattern of consumer buying may have changed significantly since then.

You Have a Stake—To get the index back on the track, the U. S. Labor Dept. is asking Congress for the funds to check the bases. The recheck will cost the government, and you, \$114,200.

But many union contracts are geared to changes of the index. As you know, if it drops, workers take

a cut. If it jumps, they get a boost.

There's no attempt to predict here that either side would get a break in a new evaluation—or that either side is getting a break now. But changing times and widely varying buying habits should be brought up to date. It's just good business.

Even Pessimists Are Happy

Fun for Pessimists—Now that business is leveling off somewhat, pessimists are having a field day.

After all, they have been predicting a leveling for over a year or more. But don't lose sight of the fact that it's only a leveling.

You may have observed that all the pessimistic talk comes from the semi-pros or the professional forecasters, not the general public.

Eager to Invest—The very fact that money stays tight (with only a scant easing here and there) is an

indication of durable prosperity. The type of borrowing that is sought is not the depression or scare type, but the type that is betting on continued prosperity.

Indications Are Steady—The Federal Reserve Board reports industrial activity in February unchanged from the January rate, with employment, personal incomes, and retail sales continued at record levels.

Business loans increased, although total bank credit declined.

1956 Was One of Steel's Best

But It Was Also a Year of Frustrations

Steel enjoyed a strong demand for the entire year. In spite of a month-long strike, shipments were almost a record.

Climbing costs, unrealistic depreciation, and other factors mar otherwise favorable picture.

■ Taking stock of 1956, steel producers find danger signals mixed in a generally pleasant outlook. Product shipments were only a little under the peak level of 1955. Total dollar volume of sales increased. Industrywide earnings showed a modest gain.

Despite this strong showing in a year that saw most mills strike-bound for a month, the annual reports of major producers voice forebodings. Big bugaboo is rising costs. U. S. Steel refers to 20 years of "unremitting cost inflation," saying steel wages are up three and a half times over 1940 while steel prices

have increased only two and a half times.

Why Prices Climbed—To meet higher costs, the mills raised prices twice in 1956. Extras went up early in the year; base prices jumped after the wage settlement. These hikes helped boost the dollar value of mill sales by 8.5 pct last year in the face of a 1.9 pct drop in shipping tonnage.

Net income also rose—by 0.8 pct. Property sales and special tax situations contributed to this gain. Many of the larger mills reported lower earnings in 1956. And in relation to sales, the industry's profit margin slipped 7.7 pct.

Scrap Prices Hurt—The profit margin decline was partly due to abnormal costs, arising from the strike. A hefty wage increase added to the load. And finally there was a rapid climb in material costs in the second half of the year. Semi-

integrated producers were particularly hard hit as scrap prices topped \$60 in the fourth quarter. For the industry as a whole, costs rose over \$5 a ton between August and January.

Another point that bears on earnings is the growth of the steel industry. It was bigger in 1956 than in 1955. The mills had 2 pct more ingot capacity, 5 pct more common

See Financial Analysis, facing P. 80.

stock, 7.4 pct more invested capital. Spreading earnings over the increased common stock shows a drop from \$7.24 per share in 1955 to \$6.69 per share last year.

Depreciation Unrealistic — The real gripe of the mills, though, is that profits are unrealistically inflated. They say a portion of what now counts as taxable income should be going into depreciation funds. Under present income tax laws, the mills depreciate facilities on the basis of original cost. They contend they should be allowed to set aside larger sums because it will cost more to replace facilities than it did to build them originally.

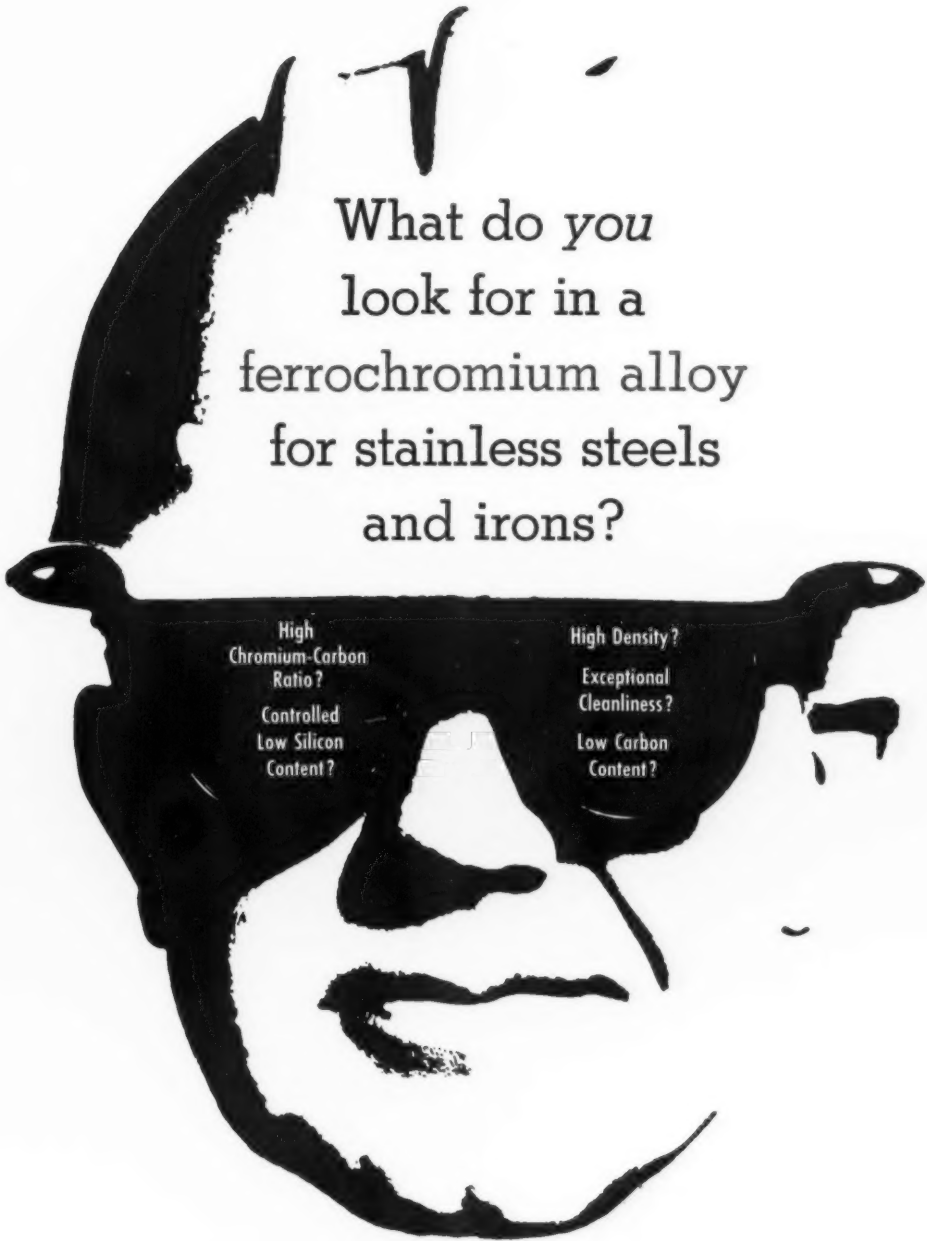
U. S. Steel calls the present system "hidden taxation of capital." The corporation says it has been taxed \$608 million since 1939 on funds that should have been earmarked for depreciation. The situation is called "highly inequitable because it results in a higher rate for those industries which require relatively heavier investment in longer term facilities than the average for all industry."

Dividends Improved—Common dividends declared last year totaled over \$445 million, or 23 pct more than in 1955. Preferred dividends dropped.

1956 Steel Earnings—The Top Twelve

Net income, in thousands of dollars, of 12 steel companies rated in order of reported 1956 profits, with pct of change from 1955.

COMPANY	1956	1955	PCT OF CHANGE
U. S. Steel Corp.	\$348,098	\$370,099	- 5.9
Bethlehem Steel Corp.	161,411	180,191	- 10.4
Republic Steel Corp.	90,406	86,271	+ 4.8
Armco Steel Corp.	65,593	64,350	+ 1.9
Inland Steel Corp.	52,998	52,466	+ 1.0
National Steel Corp.	52,502	48,289	+ 8.7
Jones & Laughlin Steel Corp.	45,122	50,104	- 9.9
Youngstown Sheet & Tube Corp.	43,174	41,701	+ 3.5
Kaiser Steel Corp.	23,571	7,610	+209.7
Wheeling Steel Corp.	17,672	17,295	+ 2.2
Colorado Fuel & Iron Corp.	16,662	10,887	+ 53.0
Allegheny Ludlum Steel Corp.	15,261	14,985	+ 1.8



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PARKER-KALON DIVISION, GENERAL AMERICAN TRANSPORTATION CORP. Clifton, New Jersey
PHEOLL MANUFACTURING CO. Chicago 50, Illinois
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P. L. ROBERTSON MFG. CO., LTD. Milton, Ont., Canada
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RUSSELL, BURDSALL & WARD BOLT & NUT CO. Port Chester, New York
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SCOVILL MANUFACTURING CO. Waterville Division, Waterville 48, Connecticut
SEMS DIVISION, TEXTRON INC. Rockford, Illinois
SHAKEPROOF DIVISION, ILLINOIS TOOL WORKS Elgin, Illinois
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39 Sources

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DATA COVER OPERATIONS OF 28 COMPANIES REPRESENTING 93 PCT OF THE INGOT CAPACITY OF THE UNITED STATES AS OF JAN. 1, 1956

COMPANY	Year	Ingot Capacity Net Tons	Ingot Production Net Tons	Percent of Capacity Operated	Steel Shipments Net Tons	Net Sales and Operating Revenue	Provision for Federal Income Taxes	Net Income	Net Income Percent of Sales	Number of Common Shares Outstanding	Earnings Per Common Share
U. S. Steel Corp.	1956	39,582,000	33,402,000	85.2	23,911,000	\$4,228,877,241	\$331,000,000	\$348,098,916	8.2	53,699,617	\$6.01
	1955	39,215,000	35,309,000	90.8	25,506,000	4,097,680,287	366,000,000	370,099,353	9.0	53,495,274	6.44
Bethlehem Steel Corp.	1956	20,000,000	18,322,308	91.6	13,198,783	2,343,478,150	147,000,000	161,411,625	6.9	10,105,462	15.33
	1955	19,100,000	18,820,912	98.5	13,553,823	2,114,599,636	181,000,000	180,191,708	8.5	9,597,127	18.09
Republic Steel Corp.	1956	10,202,000	9,348,898	91.1	6,783,307	1,244,214,346	94,700,000	90,406,665	7.3	15,510,288	8.84
	1955	10,262,000	9,680,121	97.1	6,988,782	1,188,559,765	84,000,000	86,271,491	7.3	15,437,177	8.59
Jones & Laughlin Steel Corp.	1956	6,166,500	5,997,000	97.0	4,341,000	742,642,000	39,380,000	45,122,000	6.1	6,582,742	6.63
	1955	6,166,500	6,190,000	100.0	4,418,000	696,538,000	46,500,000	50,104,000	7.2	6,293,770	7.73
National Steel Corp.	1956	6,000,000				664,251,090	47,000,000	52,502,422	7.9	7,404,318	7.09
	1955	6,000,000				622,018,919	48,275,000	48,289,453	7.8	7,379,685	6.54
Youngstown Sheet & Tube Co.	1956	5,750,000	5,406,016	94.0	3,839,224	684,041,021	37,329,000	43,174,587	6.31	3,422,073	12.62
	1955	5,520,000	5,571,556	100.9	3,944,492	626,232,840	42,090,500	41,701,140	6.66	3,378,506	12.34
Inland Steel Co.	1956	5,200,000	4,915,576	94.5	3,852,719	731,767,767	55,142,000	52,998,726	7.3	5,617,973	9.43
	1955	5,000,000	5,189,509	103.8	3,954,567	663,317,374	53,050,000	52,466,098	8.0	5,509,767	9.52
Armco Steel Corp.	1956	5,150,000	5,220,147	101.4	3,936,105	761,800,102	63,290,322	65,593,182	8.61	10,879,827	6.03
	1955	4,950,000	5,099,905	103.0	4,003,532	692,683,234	66,613,787	64,350,609	9.29	10,634,112	6.05
Colorado Fuel & Iron Corp. ⁴	1956	2,471,500	2,401,231	97.16	2,134,490	341,630,224	16,891,800	16,662,653	4.9	3,383,559	4.74
	1955	2,471,500	1,936,402	78.35	1,627,587	257,543,050	10,681,800	10,887,163	4.2	2,705,671	3.79
Wheeling Steel Corp.	1956	2,130,000	1,994,745	93.7		259,554,918	18,630,000	17,672,276	6.81	1,936,029	8.20
	1955	2,130,000	2,057,288	96.6		249,445,016	18,480,000	17,295,711	6.93	1,909,780	8.12
Sharon Steel Corp.	1956	1,763,000	1,508,660	85.6	1,126,612	180,044,408	6,473,000	6,905,539	3.8	1,100,000	6.28
	1955	1,550,000	1,528,686	98.6	1,092,593	173,095,949	7,840,000	7,987,622	4.6	1,100,000	7.26
Kaiser Steel Corp.	1956	1,536,000	1,617,681	105.3	1,140,776	201,489,824	12,055,000	23,571,852	11.7	3,246,500	6.57
	1955	1,536,000	1,483,327	96.6	987,730	155,354,222	7,145,000	7,610,843	4.9	3,200,000	1.67
Crucible Steel Co. of America	1956	1,423,400				263,922,898	12,910,000	12,767,625	4.8	1,818,228	7.02
	1955	1,351,400	1,222,176	90.4		237,715,380	15,570,000	13,208,602	5.6	1,641,162	7.26
McLouth Steel Corp. ⁹	1956	1,380,000	1,372,592	99.5	1,092,877	163,906,619	9,110,000	8,806,258	5.4	1,487,060	5.01
	1955	1,380,000	1,125,430	81.5	1,085,916	144,987,476	7,375,000	8,148,342	5.6	1,189,600	4.53
Pittsburgh Steel Co.	1956	1,320,000	1,139,882	86.4	1,077,610	179,133,961	3,404,000	6,225,000	3.49	1,519,165	3.24
	1955	1,320,000	1,303,503	98.8	1,132,437	177,707,556	4,372,000	7,515,470	4.25	1,441,102	4.31
Detroit Steel Corp.	1956	1,290,000	1,032,237	80.0	909,261	123,616,057	9,015,000	8,747,092	7.1	3,018,932	2.78
	1955	1,290,000	888,443	68.9	787,788	101,898,889	6,715,966	6,317,860	6.2	3,018,932	2.07
Granite City Steel Co.	1956	1,080,000	1,151,620	107.0	1,057,932	137,131,233	15,800,000	15,109,411	11.0	2,127,044	7.04
	1955	1,080,000	1,091,389	101.0	961,101	116,293,657	13,703,700	12,610,820	11.0	2,017,074	6.05
Barium Steel Corp.	1956	893,000	732,600	82.0		119,536,637	8,118,951	7,009,956	5.86	3,533,533	1.98
	1955	893,000	520,900	58.3		75,084,700	995,255	655,319	.87	3,227,700	.20
Allegheny Ludlum Steel Corp.	1956	864,200	666,918	77.2	453,822	287,078,052	16,867,000	15,261,090	5.32	3,781,667	4.04
	1955	864,200	683,195	79.1	464,231	255,587,054	16,554,000	14,985,660	5.86	1,777,706	4.13
Northwestern Steel & Wire Co. ¹⁰	1956	825,000	692,326	83.9	585,816	74,157,804	5,760,000	5,076,959	6.8	2,453,475	2.07
	1955	825,000	502,443	60.9	391,675	51,403,405	4,610,000	4,131,969	8.0	817,825	5.05
Lukens Steel Co.	1956	750,000	703,434	93.8	512,735	105,173,925	7,675,000	7,504,889	7.1	317,976	23.60
	1955	750,000	691,444	92.2	490,569	79,307,572	2,400,000	1,731,238	2.2	317,976	5.44
Copperweld Steel Co.	1956	660,000				100,541,926	4,220,000	3,440,872	3.4	790,601	4.08
	1955	618,380				78,490,150	2,990,000	2,365,459	3.0	755,218	2.81
Alan Wood Steel Co.	1956	625,000	713,859	109.1	495,098	69,330,353	2,024,000	3,095,727	4.5	696,007	4.04
	1955	625,000	665,908	106.5	462,046	58,375,609	1,619,000	2,551,530	4.4	675,735	3.32
Lone Star Steel Co.	1956	550,000	629,579	114.4	485,269	88,650,577	11,000,000	10,151,363	11.5	2,640,000	3.84
	1955	550,000	556,304	101.0	442,762	74,489,168	4,665,000	4,759,086	6.4	2,640,000	1.80
Laclede Steel Co.	1956	500,000	505,575	101.1	398,181	66,509,030	4,575,000	4,086,071	6.14	206,250	19.81
	1955	500,000	473,708	94.7	386,408	58,191,338	4,700,000	4,047,053	6.95	206,250	19.62
Keystone Steel & Wire Co.	1956	450,000	438,364	97.41	353,019	66,629,700	7,993,443	8,013,050	12.03	1,875,000	4.27
	1955	425,000	416,090	97.90	344,414	62,020,363	8,830,268	8,768,519	14.14	1,875,000	4.68
Continental Steel Corp.	1956	394,000	368,059	93.4	272,996	46,703,332	2,810,000	2,793,574	5.98	501,620	5.57
	1955	394,000	384,380	97.6	285,972	44,881,747	2,760,000	3,022,143	6.73	501,620	6.02
Rotary Electric Steel Co.	1956	300,000	222,170	74.0	153,771	53,650,698	2,357,000	2,297,587	4.3	772,795	2.97
	1955	300,000	270,283	90.1	193,807	54,370,322	4,150,000	3,772,074	7.0	696,700	5.41
GRAND TOTAL	1956	119,410,000	107,000,000 ¹¹	89.8 ¹¹	77,300,000 ¹¹	14,329,463,893	1,050,902,715	1,044,506,967	7.2	150,427,681	6.96
	1955	117,066,980	109,000,000 ¹¹	93.0 ¹¹	78,800,000 ¹¹	13,207,872,578	2,039,738,284	1,035,846,535	7.8	143,440,169	7.24
Percent change 1956 over 1955		+2.0	-1.8	-3.4	-1.9	+8.5	-48.5	+0.8	-7.7	+4.9	3.9

1. Payable after one year.

2. Less treasury stock.

3. Includes \$2,979,371 extraordinary income.

4. Fiscal year ended June 30.

5. Earned only.

6. Year end.

7. Present shares.

8. Plus stock dividend.

9. Changes relate to 25 per cent common stock dividend and 10 per cent preferred redemptions.

10. Fiscal year ended July 31.

11. 1955 adjusted for 2-for-1 stock split.

UNITED STATES AS OF JAN. 1, 1956

Net Income	Net Income Percent of Sales	Number of Common Shares Outstanding	Earnings Per Common Share	Common Dividends Declared	Number of Preferred Shares Outstanding	Preferred Dividends Declared	Funded Debt ¹	Preferred Stocks	Common Stocks	Sum
\$548,098,916	8.2	53,699,617	\$6.01	\$144,884,201	3,602,811	\$25,219,677	\$245,023,677	\$360,281,100	\$894,993,617	\$1,508,330,916
370,099,353	9.0	53,495,274	6.44	122,907,433	3,602,811	25,219,677	286,083,534	360,281,100	891,587,900	1,330,916,353
161,411,625	6.9	10,105,462	15.33	82,376,452	933,887	6,537,209	278,621,000	93,388,700	376,612,630	859,411,625
180,191,708	8.5	9,597,127	18.09	69,490,469	933,887	6,537,209	336,904,500	93,388,700	305,445,730	787,191,708
90,406,665	7.3	15,510,288	5.83	40,631,054			40,754,784		155,317,286	502,406,665
86,271,491	7.3	15,437,177	5.59	38,404,321			44,029,724		154,585,856	451,271,491
45,122,000	6.1	6,582,742	6.63	15,896,000	293,568	1,468,000	130,275,000	29,357,000	65,534,000	356,122,000
50,104,000	7.2	6,293,770	7.73	14,042,000	293,568	1,468,000	105,473,000	29,357,000	62,769,000	328,104,000
52,502,422	7.9	7,404,318	7.09	29,568,645	None	None	110,000,000	None	74,043,180	348,502,422
48,289,453	7.8	7,379,685	6.54	23,940,275	None	None	55,000,000	None	73,796,850	324,289,453
43,174,587	6.31	3,422,073	12.62	15,313,249	None	None	98,750,000	None	109,647,308	289,174,587
41,701,140	6.66	3,378,506	12.34	12,645,383	None	None	100,000,000	None	106,314,056	256,701,140
52,998,726	7.3	5,617,973	9.43	23,657,283			129,236,200		100,514,559	268,998,726
52,466,098	8.0	5,509,767	9.52	23,044,176			84,115,800		93,633,807	238,466,098
65,593,182	8.61	10,879,827	6.03	27,709,798			51,330,000		108,798,267	320,593,182
64,350,609	9.29	10,634,112	6.05	20,625,713			57,329,355		106,341,123	280,350,609
16,662,653	4.9	3,383,559	4.74	5,870,876	226,058	615,169	49,769,000	11,332,649	16,835,119	111,662,653
10,887,163	4.2	2,705,671	3.79	2,924,786	226,058	634,034	55,312,000	11,355,664	13,442,248	90,887,163
17,672,276	6.81	1,936,029	8.20	5,942,540	357,496	1,787,593	44,151,900	35,749,600	19,360,290	94,672,276
17,295,711	6.93	1,909,780	8.12	5,322,941	357,526	1,787,630	48,944,800	35,752,600	19,097,800	85,295,711
6,905,539	3.8	1,100,000	6.28	3,300,000			4,600,000		11,060,390	67,905,539
7,987,622	4.6	1,100,000	7.26	2,750,000			5,000,000		11,060,390	57,987,622
23,571,852	11.7	3,246,500	6.57	1,280,000	1,540,065	2,257,693	118,921,921	38,501,625	3,246,500	84,571,852
7,610,843	4.9	3,200,000	1.67	1,280,000	1,556,090	2,280,870	126,214,970	38,902,250	3,200,000	64,610,843
12,767,625	4.8	1,818,228	7.02	5,454,684			27,900,732		45,455,715	67,767,625
13,208,602	5.6	1,641,162	7.26	4,102,905			30,820,447		41,029,064	56,208,602
8,806,258	5.4	1,487,000 ²	5.01		488,424 ³	1,349,897	56,296,000	21,736,100	24,088,572	21,806,258
8,148,342	5.6	1,189,600	4.53		540,000	1,417,500	65,551,000	24,421,150	12,936,072	24,148,342
6,225,000	3.49	1,519,165	3.24	1,474,915 ⁴	241,943	1,308,150	36,098,763	24,194,300	15,191,650	50,225,000
7,515,470	4.25	1,441,102	4.31	355,981	241,943	1,308,150	32,337,763	24,194,300	14,411,020	47,515,470
8,747,092	7.1	3,018,932	2.78	3,018,932	69,000	360,000	26,000,000	4,650,582	3,018,932	54,747,092
6,317,860	6.2	3,018,932	2.07	754,733	69,000	55,000	28,000,000	6,000,000	3,018,932	48,317,860
15,109,411	11.0	2,127,044	7.04	5,290,519	23,071	135,253	35,950,000	2,307,100	26,593,712	48,109,411
12,610,820	11.0	2,017,074	6.05	3,876,744	44,790	440,105	34,250,000	4,470,000	25,233,365	38,610,820
7,009,956	5.86	3,533,533	1.98	1,515,684	None	None	8,248,027	None	3,533,533	26,009,956
655,319	.87	3,227,700	.20	906,001	None	None	1,792,634	None	3,227,700	19,655,319
15,261,090	5.32	3,781,667	4.04	6,382,144		394	39,609,900		3,781,667	97,261,090
14,985,660	5.86	1,777,706	4.13 ⁵	4,030,086	40,572	325,906	30,276,000	40,057,200	1,777,706	85,985,660
5,076,959	6.8	2,453,475	2.07	989,486	None	None	8,033,769	None	12,267,375	12,076,959
4,131,969	8.0	817,825	5.05	408,912	None	None	8,734,777	None	4,089,125	16,131,969
7,504,889	7.1	317,976	23.60	1,907,856	None	None	4,800,000	None	3,179,760	31,750,889
1,731,238	2.2	317,976	5.44	556,458	None	None	6,000,000	None	3,179,760	25,731,238
3,440,872	3.4	790,601	4.08	1,550,187	67,248	216,036	8,260,000	3,362,400	3,953,005	24,440,872
2,365,459	3.0	755,218	2.81	995,834	79,900	244,553	5,332,000	4,145,000	3,776,090	22,365,459
3,095,727	4.5	696,007	4.04	946,029	48,398	282,396	5,250,000	4,839,800	6,960,070	19,305,727
2,551,530	4.4	675,735	3.32	918,474 ⁶	60,173	306,433	5,250,000	6,017,300	6,757,350	17,251,530
10,151,363	11.5	2,640,000	3.84				63,300,000		2,640,000	34,151,363
4,759,086	6.4	2,640,000	1.80				75,745,068		2,640,000	24,759,086
4,086,071	6.14	206,250	19.81	1,650,000	None	None	2,737,705	None	4,125,000	19,486,071
4,047,053	6.95	206,250	19.62	1,237,500	None	None	2,999,915	None	4,125,000	17,407,053
8,013,050	12.03	1,875,000	4.27	3,750,000	None	None	None	None	2,604,167	32,013,050
8,768,519	14.14	1,875,000	4.68	3,750,000	None	None	None	None	2,604,167	28,768,519
2,793,574	5.98	501,620 ⁷	5.57	13,379,455	None	None	2,200,000	None	7,018,789 ⁸	14,293,574
3,022,143	6.73	501,620	6.02	1,504,860	None	None	2,400,000	None	7,018,789	13,022,143
2,297,587	4.3	772,795	2.97	1,506,542	None	None	4,461,000	None	7,727,950	13,297,587
3,772,074	7.0	696,700	5.41	1,045,050	None	None	5,021,000	None	6,967,000	10,772,074
14,506,967	7.2	150,427,681	6.96	445,246,522	7,882,969	41,537,377	1,630,570,378	629,700,956	2,108,103,043	5,380,506,967
10,846,335	7.8	143,440,469	7.24	358,194,035	8,037,228	42,025,067	1,638,918,267	678,342,264	1,984,065,900	4,792,846,335
0.8	7.7	+4.9	-3.9	+24.3	-1.9	-1.2	-0.5	-7.2	+6.3	

1. Rate to 25 per cent common stock dividend and to redemptions.

2. Ended July 31.

3. Based for 2-for-1 stock split.

12. Incl. 259 shares treasury stock.

13. Less cost of treasury stock.

14. Estimated, based on national operating rate.

15. National rate for industry by AISI.

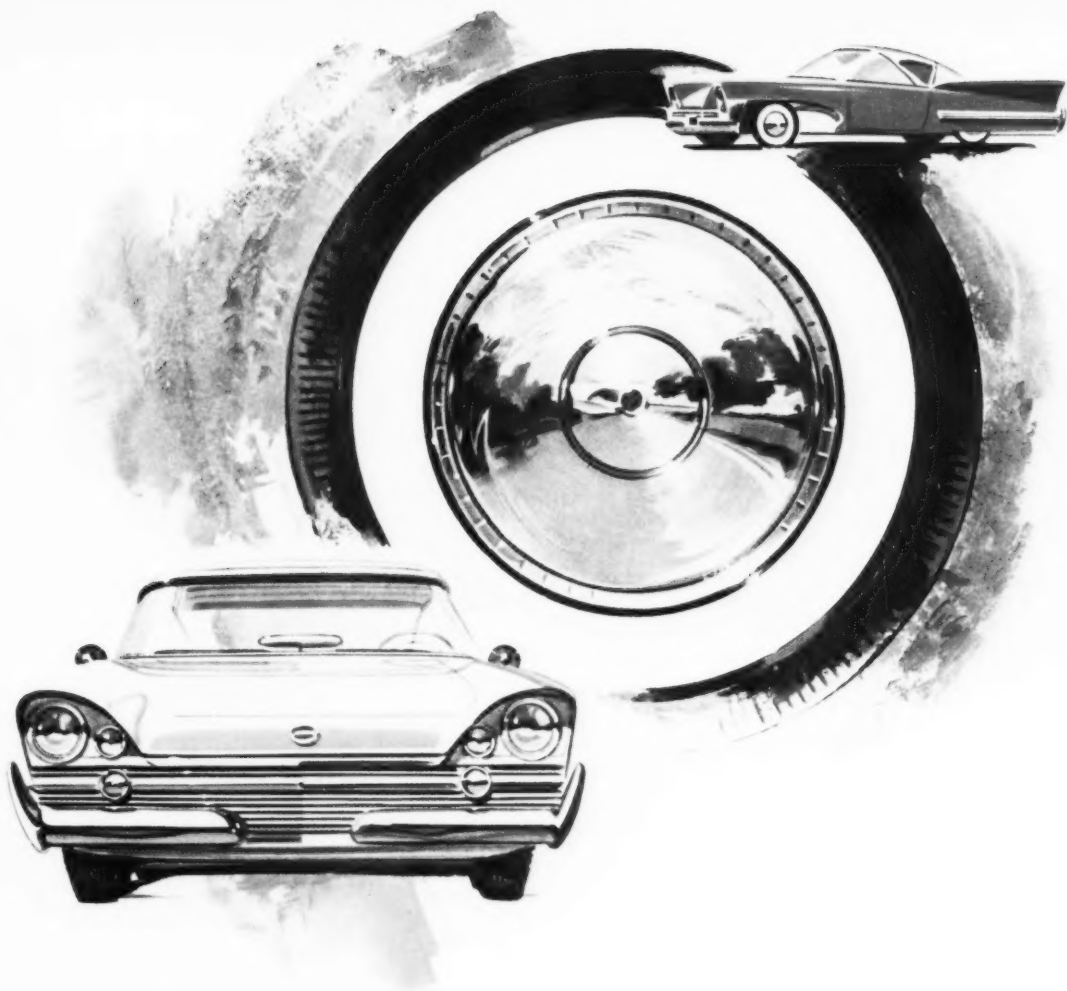
**THE IRON AGE
STEEL INDUSTRY FINANCIAL
ANALYSIS 1956-1955**

Surplus	Invested Capital	Working Capital	Net Income Percent of Investment	Year	COMPANY
1,508,698,089	\$3,008,996,483	\$603,739,028	11.8	1956	U. S. Steel Corp.
1,330,703,051	2,868,655,585	695,141,324	13.2	1955	
859,734,079	1,608,356,409	683,826,330	10.7	1956	Bethlehem Steel Corp.
787,236,115	1,522,975,045	809,994,475	12.4	1955	
502,176,924	698,248,994	244,937,412	13.6	1956	Republic Steel Corp.
451,511,235	650,126,815	256,130,416	13.7	1955	
356,260,000	581,426,000	153,783,000	8.3	1956	Jones & Laughlin Steel Corp.
328,613,000	526,212,000	165,330,000	10.2	1955	
348,308,079	532,312,345 ²	140,711,249	10.26	1956	National Steel Corp.
324,154,051	452,911,987	123,520,562	11.00	1955	
289,967,204	498,364,512	220,825,291	9.32	1956	Youngstown Sheet & Tube Co.
256,576,715	462,890,771	218,104,489	9.71	1955	
268,006,937	497,757,696	204,781,191	11.2	1956	Inland Steel Co.
238,665,494	416,415,101	165,895,150	12.9	1955	
320,181,532	480,309,799	191,325,287	14.07	1956	Armco Steel Corp.
280,345,277	444,015,755	182,802,349	14.95	1955	
111,247,882	189,184,650	71,113,849	10.06	1956	Colorado Fuel & Iron Corp. ⁴
90,215,453	170,325,365	66,703,600	7.98	1955	
94,976,719 ⁵	236,452,198	82,455,573	8.16	1956	Wheeling Steel Corp.
85,034,576	229,796,667	76,442,071	8.16	1955	
67,055,800	82,716,190	35,115,566	9.2	1956	Sharon Steel Corp.
57,038,561	73,098,951	33,401,989	11.2	1955	
84,507,507	245,177,553	53,140,687	11.9	1956	Kaiser Steel Corp.
64,073,903	233,205,835	43,402,630	5.8	1955	
67,104,069	140,460,520	60,402,277	10.1	1956	Crucible Steel Co. of America
56,998,410	128,847,921	49,185,740	11.3	1955	
21,112,257 ⁶	123,232,929	26,535,972	8.3	1956	McLouth Steel Corp. ⁹
24,808,306	127,716,528	22,460,702	7.6	1955	
50,428,252	125,912,965	39,476,945	6.23	1956	Pittsburgh Steel Co.
47,454,143	118,397,226	31,699,615	7.64	1955	
54,026,855	87,696,369	24,376,260	11.8	1956	Detroit Steel Corp.
48,674,277	85,693,209	23,274,336	9.6	1955	
48,994,100	113,844,912	36,838,542	14.0	1956	Granite City Steel Co.
38,482,977	102,436,342	33,176,588	14.0	1955	
26,027,074	37,808,634	16,473,105	19.71	1956	Barium Steel Corp.
19,594,852	24,615,186	8,284,403	3.15	1955	
97,292,414	140,683,981	61,760,622	11.70	1956	Allegheny Ludlum Steel Corp.
85,015,015	121,125,921	48,721,490	13.23	1955	
12,670,706	32,971,850	11,189,669	16.6	1956	Northwestern Steel & Wire Co. ¹⁰
16,761,565	29,585,467	9,773,965	15.6	1955	
31,613,924	39,593,684	20,980,040	19.0	1956	Lukens Steel Co.
25,154,853	34,334,613	15,516,158	5.9	1955	
24,692,578	40,267,983	16,266,629	9.31	1956	Copperweld Steel Co.
22,321,806	35,574,896	18,601,781	7.52	1955	
19,603,965	36,653,835	7,246,607	8.9	1956	Man Wood Steel Co.
17,926,635	35,951,285	8,104,567	7.8	1955	
34,433,570	100,373,570	33,257,307	13.9	1956	Lone Star Steel Co.
24,282,207	102,667,275	27,498,575	8.6	1955	
19,969,856	26,832,561	13,649,482	15.64	1956	Laclede Steel Co.
17,533,785	24,658,700	14,065,928	16.89	1955	
32,955,673	35,559,840	10,942,937	22.54	1956	Keystone Steel & Wire Co.
28,692,623	31,296,790	13,186,461	28.02	1955	
14,917,126	24,135,915	11,235,428	11.97	1956	Continental Steel Corp.
13,502,295	22,921,084	10,542,829	13.64	1955	
13,477,297	25,666,247	9,290,560	9.4	1956	Rotary Electric Steel Co.
10,993,385	22,981,385	8,192,801	16.9	1955	
3,380,440,468	9,790,957,624	3,085,676,836	10.7	1956	GRAND TOTAL
1,792,364,565	9,114,078,444	3,179,124,994	11.3	1955	
+ 12.3	+ 7.4	- 2.9	- 5.3		Percent change 1956 over 1955

STEEL INDUSTRY FINANCIAL ANALYSIS 1956-1955







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For enduring beauty that sells in a new car and
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Maintenance cut 49% with **SKF** anti-friction bearings

SKF "Triple-Seal" Pillow Blocks, used by an eastern limestone producer in pulverizing tube mills, have saved thousands of dollars since their installation in 1948.

In comparable operating periods, counter-shaft failures dropped from 11 to 2, bearing maintenance costs were cut 49%, production increased 70%, power savings averaged 10% to 20%.

Required to operate in a highly abrasive "snow-storm" of powdered limestone, these triple-sealed units continue to save money for the user. They will do the same for you.

For further information on how these remarkable "Triple-Seal" Pillow Blocks can be applied most effectively to your products, get in touch with your local **SKF** Sales Office.

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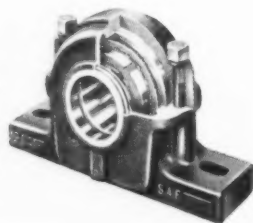
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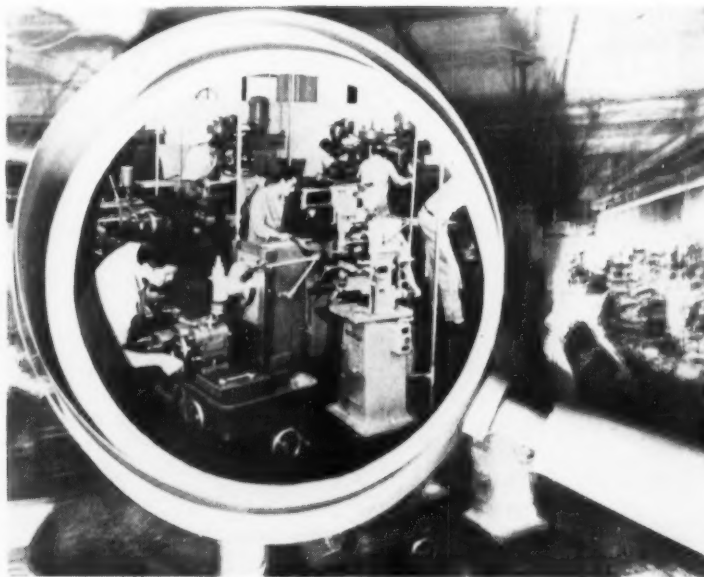
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- Cylindrical Roller Bearings
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- Tapered Roller Bearings (Tyson)

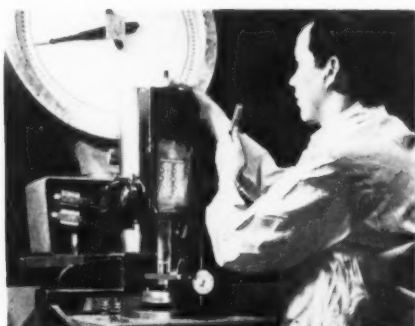
*Reg. U.S. Pat. Off. Tyson Bearing Corporation

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.





TO CUT COSTS: TAKE A CLOSE LOOK AT SCRAP CONTROL



The staunchly competitive metal-working industry is now more quality conscious than ever before. It accepts quality control as the shortest, most direct route to productive efficiency. Scrap control systems help cut costs by keeping close tabs on all rejections and analyzing basic causes.

In This Feature

Results of an Iron Age Management Survey devoted exclusively to quality control and in-plant scrap charging systems . . . How companies are organizing their quality control departments . . . Why inspection is being allowed greater independence . . . Why smaller companies are just as "quality conscious" as the largest . . . Along with practical pointers on scrap control planning to brighten your profits picture and make the system work.

Plant Management Survey

Spotlights Inspection

Major segments of the metal-working industry agree that effective quality control is essential to profitable operation. The extent of this agreement comes close to unanimity.

What's more, they are also of the opinion that a workable "in-plant scrap charging" system—a means for keeping close tabs on all rejections—is something quality control can't afford to be without.

Good Cross-section—These are highlights culled from a recent Iron Age Management Survey. To reach an adequate cross-section of the industry, the survey covered over 2500 companies manufactur-

ing transportation equipment, fabricated metal products, instruments, electrical equipment, and machinery.

Company size—as measured by number of employees—ranged from smaller companies employing as few as 250 workers to the "bigger fellows" with more than 2500 on the payroll. Regardless of size, the overwhelming majority of companies replying recognized as vital both quality control and the needed back-up provided by an in-plant scrap charging system.

Big Questions—What is the significance of this widespread recog-

nition? And how should it affect you or, more specifically, your business thinking?

If you've been selling quality control short, you're part of a tiny minority whose competitive position could be precarious. If your present quality control setup lacks machinery for keeping complete records of all rejections, together with provisions for re-work and corrective action, now is the time to correct the deficiency.

If you continue to procrastinate, you do so with the knowledge that you are out of step with the majority.

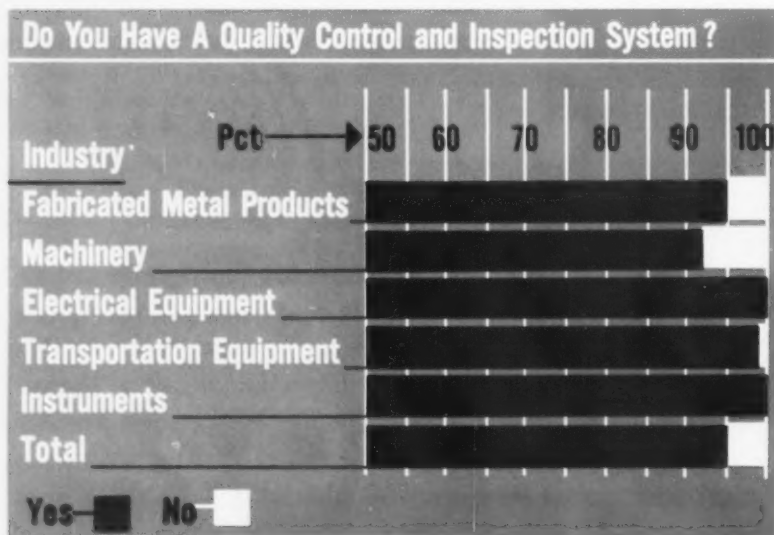
Here are facts and figures to help guide your thinking:

Wrong Assumption—Do you assume, for example, that while instrument makers can readily justify a complete quality control system, manufacturers of less "finicky" products need proportionately less control? If this is your starting premise, the survey figures prove you're dead wrong.

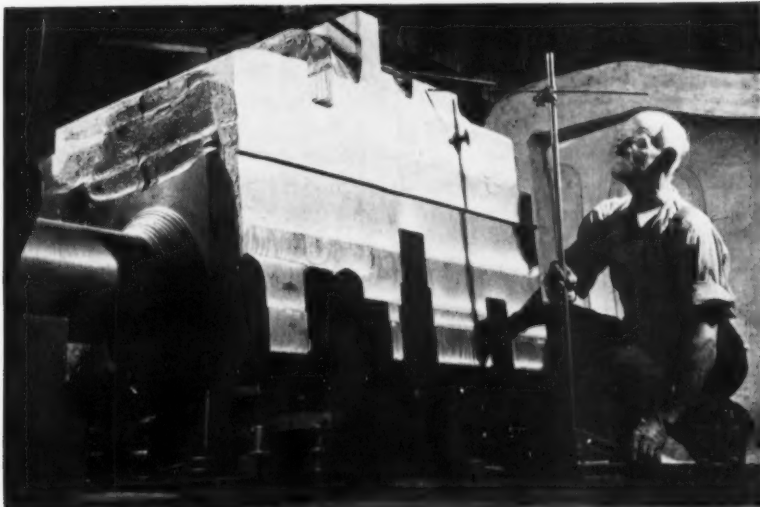
All of the instrument makers surveyed **do** have reasonably complete systems for quality control and inspection. **But**—and here's the important point—so do **all** of the makers of electrical equipment and 99 pct of the plants manufacturing transportation equipment.

Fabricated metal products, covering everything from hairpins and thumbtacks to complicated stampings, intricate machined components and roller bearings, are covered by

IRON AGE SURVEY | CHART I



Reporting Plants By Size and Industry				In Pct
Industry	Number Of Workers			
	250-499	500-999	1000-2499	2500 and over
Fabricated Metal Products	57	32	6	5
Machinery	48	27	19	6
Electrical Equipment	46	23	20	11
Transportation Equipment	30	28	30	12
Instruments	60	10	30	0
Total	46	27	19	8



quality control systems in 95 pct of the plants surveyed.

Low Is High—Low on the totem pole, manufacturers of machinery (except electrical) indicate that about 92 pct of their number now operate under an organized system of quality control. And 92 pct is certainly a preponderant majority.

The overall average for the entire metalworking industry is 95 pct with quality control systems and a paltry 5 pct without.

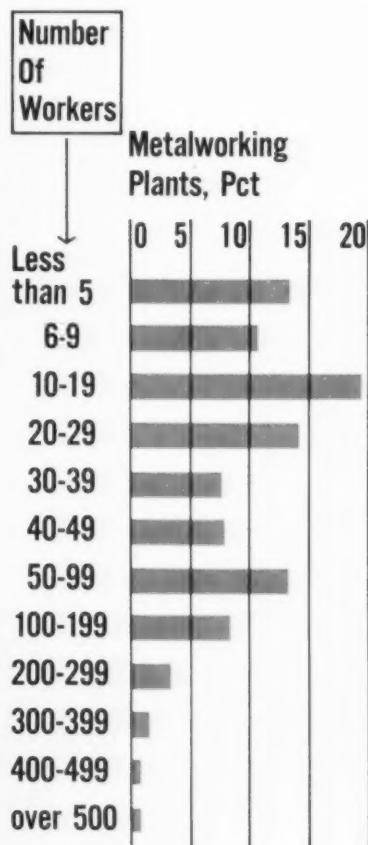
Does the **size** of a company significantly affect whether or not it operates under a system of quality controls? This question is aimed at an old and persistent myth. There was a time when the smaller manu-

facturing plants deluded themselves with the notion that being small rendered them immune from both inspection standards and the systematization imposed by quality control. This is no longer the case.

Large and Small—The Iron Age survey was not pointed primarily at the "big fellows." On the contrary, 46 pct of all replies received came from companies whose total number of employees ranged from 250 to 499. Almost all of these companies are operating under some system of quality control.

Adding to the importance of the survey is the fact that the distribution of replies in terms of company size closely approximates actual

Workers Assigned
To Quality Control and
Inspection

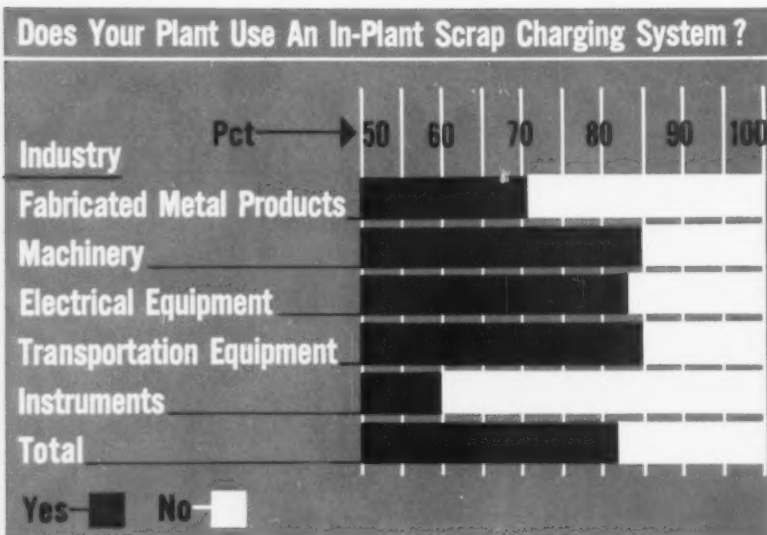


conditions within the industry.

An average of 27 pct of all replies received came from companies employing from 500 to 999 persons. Still larger companies (1000 to 2499 employees) represent only 19 pct of the total. A mere 8 pct of the replies came from companies with 2500 or more employees.

Forget Size—The distribution proves conclusively that the effectiveness of quality control has almost nothing whatsoever to do with company size.

There is a quantitative relationship between company size and the number of persons assigned exclusively to quality control and inspection. But even this relationship



is of a general nature and follows no fixed parallels.

In many cases, the nature of the product affects the size of the quality control staff as much, or more, than the factor of company size.

Quality Conscious—Here are a few statistics that may come as a surprise—largely because they indicate that the metalworking industry is far more quality conscious than many people suspect:

Remember that 46 pct of all survey replies came from companies with from 250 to 499 employees. Now balance that figure against the fact that more than 40 pct of all companies queried assign at least 10 and sometimes as many as 19 persons to quality control and inspection **exclusively**.

This means that smaller metalworking plants are providing at least one full-time quality inspector for each 25 employees—**both** productive and non-productive. Such a distribution marks a significant trend.

More Overhead—It indicates that quality control is generally recognized as essential to manufacturing operations, regardless of the size of operations. And it also points up the fact that most metalworking plants are willing to pay for this service of quality maintenance—

even though it represents a hefty percentage of non-productive overhead costs.

Close to 85 pct of all companies in the industry employ an average of 25 people in their quality control and inspection departments. A few companies hire as many as 500 or more employees to cover these same functions.

Systems Vary—Qualitatively, the various inspection systems reported vary in many respects. Some of the systems are strong; some are weak. Some are highly efficient, others much less so. Many are based on carefully written standards. A few are struggling along without even the semblance of a fixed standard.

Out of this myriad of systems now in use, there comes one very promising sign. Most plant quality control and inspection departments operate as independent units. They are not subordinate to either manufacturing or engineering. This condition of complete independence was reported by 85 pct of all companies surveyed.

In the "Know"—This highly meaningful distribution may fail to impress those who have not made a study of departmental organization. But to the initiated, it means that the quality control and in-

spection function is being provided with muscle of its own.

In general, its place in a company's structure is not being compromised. For the most part, it is allowed equal status with other important departments—especially engineering and manufacturing.

Most quality control experts are likely to commend the general trend. Statistics indicating an almost universal acceptance of "inspection's independence" tend to prove that the experts are pretty much correct in their opinion.

Key Issue—But how about "in-plant scrap charging" systems? Does modern metalworking management accept such systems in theory? In practice?

The overall average for the entire industry shows that 82 pct of all metalworking plants now make use of such systems. Preference seems to run highest with manufacturers of transportation equipment and machinery. Each group reports that 85 pct of all their plants now have some variety of scrap charging system. Electrical equipment manufacturers run a very close second with 83 pct.

Special Case—Such systems evidently hold far less appeal for the manufacturers of instruments. Only 60 pct of this group uses a scrap charging system.

It is fair to suppose, however, that at least a part of this seeming lack of interest stems from certain distinct features of instrument making which set it apart. Its specialization in manufacturing techniques is not typical of the rest of the metalworking industry.

Catch-all—Over 70 pct of all fabricated metal products manufacturers report the use of a scrap charging system. While this figure falls below the industry average, it is likely that future interest will result in a marked upswing. Because this group includes most of the smallest metalworking plants, the movement toward adoption of more advanced techniques—technological or industrial—is likely to be more gradual.

Guide To Better Scrap Control

■ Here are some basic pointers for building your "in-plant scrap charging" system.

The first pointer emphasized in the survey is that a scrap charging system will be effective only if it is provided with an organizational atmosphere ready and willing to give it full support. Management must want the system and must be prepared to sell its virtues to the rank and file.

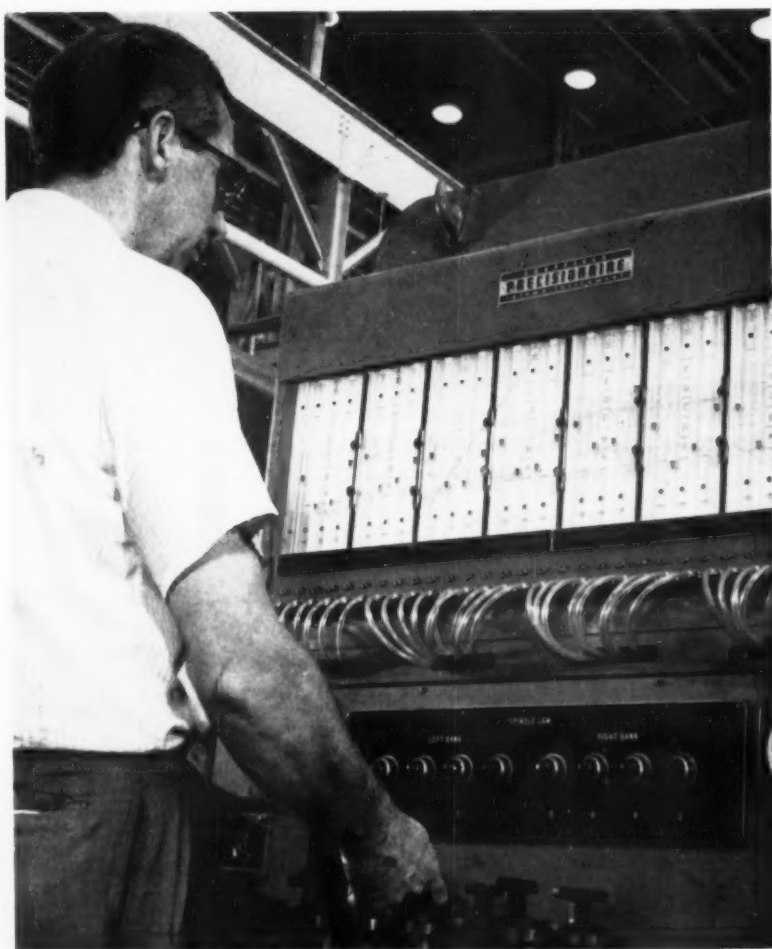
Top Management — Organization-wise, ultimate responsibility for the operation of the system must rest with top management. This puts the company's fullest authority behind the system, guaranteeing that it will be equally applicable to all departments.

Experience points to another cardinal rule: It is best to choose one top executive to supervise the overall operation of a scrap charging system. In cases of dispute, his authority should be final. And it should extend to every department that operates under the plan—manufacturing, inspection, engineering—even purchasing.

So much for general principles and the responsibilities of top management. Both play a crucial role in providing the system with impetus, authority, stability, and continuity.

Cut Costs—Still, the prime object of the system is to produce tangible results in the form of lowered costs and fewer scrapped parts. And the achievement of this goal depends almost entirely upon "middle management" supervision and the rank and file.

Although a quality control department is charged with the maintenance of quality standards in production, it seldom bears the brunt of the work involved in operating



LATEST TOOLING: Up-to-the-minute equipment eases the inspector's job, but doesn't eliminate need for effective scrap controls.

a scrap control system. This task is assigned to manufacturing.

New Group — Obviously, the manufacturing department has to create a group within itself to chase the scrap charging program. This group—the nucleus of the entire program—may act as a committee or as separate individuals assigned to particular sections on the production floor.

The size of the group that can

justifiably be assigned to the scrap control job is almost always dependent upon the total number of productive workers.

Most manufacturing departments choose regular line foremen for their scrap reduction team. During their term of service, these men are usually released from their line supervisory responsibilities. A system of rotation is set up to avoid keeping any one man from his regular job for too long a time.



CRITICAL BLADING: Tight tolerances and surface finish requirements make careful analysis of causes of rejection almost mandatory.

Some Disagreement — Quite frankly, not all manufacturing managers are in agreement as to the soundness of a system that rotates foremen in and out of their regular assignments. The principal objection is that it keeps key men, at least temporarily, away from critical operations where they are most needed.

The objection has considerable validity, and demands that a great deal of judgment be exercised in planning foreman rotation.

Generally, the rotation plan works out satisfactorily. In many respects, it provides unforeseen impetus to manufacturing improvement. Here's why:

Good Reasons—In addition to supplying a well-trained scrap reduction team, it allows line foremen to familiarize themselves with a variety of manufacturing operations—many of which are outside their normal sphere of activity. Not only does this serve to broaden the foreman's outlook and experience, but it also tends to stimulate his thinking and make him more quality conscious.

What, specifically, do these foremen look for as they make their daily rounds? What, in other words, are the crucial sore-spots in most manufacturing operations?

"Improper" tooling rates high on the list. But don't take that too literally. In this case, the word "improper" takes on a special meaning.

All Foolproof—Actually, most "improper" tools can turn out a very "proper" job—with reasonable skill and care. So that nowadays when a tool is rated as "improper," its major fault is likely to be that it isn't foolproof.

One of the scrap foreman's chief duties is to find ways and means for making every tool setup as "foolproof" as possible. Usually, he can depend on the services of a tool designer to help him whenever such services are required.

Along with operator error, mistakes in process sheets are another major cause of scrapped parts. These mistakes range from total misinformation—such as providing incorrect dimensions or improperly listing sequence of operations—to information that simply isn't clear.

Make It Clear—Lack of clarity in instructions and the possibility of "double meanings" are the commonest faults in process sheet writing. The scrap foreman, because of his close contact with the production floor, is in an excellent position to catch these deficiencies.

Engineering design is still another factor that can contribute to a rising scrap rate. Though not intentional, many engineering designs are altogether too complex. Tolerances and surface finish requirements are sometimes much tighter than is necessary. Occasionally, a wrong material is specified.

Get Cooperation — Manufacturing cannot tackle such problems as these alone. It must get the cooperation of the engineering department in order to put through an authorized change. To some extent, it is up to the scrap foreman to request such changes.

To integrate the scrap control program within the manufacturing department, it is usual to hold weekly meetings of all foremen assigned to scrap control. These meetings afford the men a chance to swap ideas, suggest changes to their supervisors, and issue statistical reports on the scrap rate in their areas of assignment.

Regardless of the scrap tallies kept by foremen, all scrap charges must eventually be reduced to monetary terms. This is prerequisite in all accounting systems.

Tough Job—Unfortunately, this transition from number of parts scrapped to number of dollars charged may be somewhat arbitrary. It is not always easy to assign an accurate value to a scrapped part. To devote too much time to achieving such accuracy is equally wasteful.

As a result, many scrap charges represent a reasonable compromise rather than an infinitely accurate measure of costs.

Quite a few plants have adopted a system that assigns a scrap quota to each manufacturing operation or sub-section. This quota is spelled

out in dollars and cents. It is determined by multiplying the total number of productive personnel by a figure representing the average scrap allowance per worker per week.

Low Budget—On a relatively foolproof operation, this individual scrap allowance figure is likely to be very low. In one instance reported in the survey, a simple stamping operation was allowed a personal scrap budget of only 90 cents per man each week. Since there were 15 men assigned to this same operation, the total weekly scrap allowance for the sub-section was only \$13.50.

On more difficult operations—and especially those involving costly parts—the individual scrap allowance is likely to be much higher.

Keep It Tight—Even on critical components in the aircraft industry, however, the individual scrap allowance is not likely to exceed \$9 per week. This is really tight budgeting when the unit cost of some parts runs as high as \$2000.

As a rule, all scrap allowances are subject to change. The change, when it comes, is usually pointed downward. The initial allowance is almost always considered a top limit. So, as mistakes are eliminated and scrap is reduced, the scrap allowance may be lowered proportionately. This provides a continuing challenge for improvement.

Most shopmen recognize the merits of a scrap charging system, but how does it rest with organized labor?

With few exceptions, the unions recognize management's right to trim costs whether by scrap reduction or better manufacturing techniques—so long as the labor force is left pretty much intact.

Fortunately, cutting needless waste has little or nothing to do with layoffs. But where operator negligence can be proved, there's usually a set procedure under union-company agreements. A common procedure calls for the offender to be (1) re-instructed, (2) given verbal warn-

ing, (3) given written warning and (4) dismissal.

Within the confines of the scrap budgeting system, each foreman is normally allowed a reasonable amount of latitude or personal discretion. Although his section is charged with a rigidly fixed allowance, he may distribute this allowance within his own group as he thinks best.

Use Judgment—This element of freedom allows the foreman to exercise his own judgment. It serves to stimulate his business acumen, thus making him a more valuable employee.

The budgeting system also serves to highlight troublesome jobs, jobs that are especially "scrap-prone." This is another welcome service from the foreman's point of view, since it calls management's attention to his toughest problems. Once

these problems are recognized, he is more likely to get needed assistance in solving them.

Spurred by scrap budgeting systems, many plants are paying above-average attention to the "troublesome job." One genuinely effective technique is to tag or mark the troublesome job **in advance**.

Let the foreman and the operator know that the job is troublesome and **why**. This warning system frequently puts the fire out before it has a chance to start.

Defines Causes—Another positive virtue of scrap charging is that it **defines** the causes of scrap. It is scientific in its approach, rather than arbitrary. Foremen are charged with that scrap for which they are **directly** responsible. They are not charged with scrap that "occurred" in their departments, but for which they are not responsible.



MORE OVERHEAD: Metalworking industry is spending more money on inspection than ever before. But it's overhead that helps production.



INSPECTION PROBLEM: Some percentage of scrap is normally the result of sampling inspection systems, but sampling still cuts costs.

If tooling or process sheets are not in order, the scrap charge is rightfully placed with production engineering.

If plant equipment is not in proper repair, plant engineering is charged with any scrap that may result because of this discrepancy.

Production control pays for all scrap due to faulty scheduling. Even engineering, inspection, and purchasing are liable to pay for their own mistakes.

Helps Salvage — In addition to charging scrap fairly, the system makes all personnel extra-conscious of salvage possibilities. If there is any reasonable chance of rework, it will probably be found in an effort to avoid a scrap charge.

The inspection department enters the picture at this point, since it can exercise considerable authority over possible salvage operations.

Inspection's major contribution in this respect is to decide, in the light of past experience and present requirements, whether or not a part can be successfully reworked and whether rework is economically feasible.

Inspection's Job — Inspection, quite naturally, has many other responsibilities in connection with the operation of a scrap charging system. It segregates and properly identifies all rejected parts. It plays a major role in determining the cause of rejection (sometimes with the help of engineering). It frequently proposes corrective action. And it is usually the final arbiter in all scrap charge disputes.

But inspection, too, can be charged with scrap. Most of its scrap burden results from its own failure to catch other people's mistakes.

Cost of Sampling — A certain percentage of the scrap charged to inspection is the result of the department's dependence on sampling systems. Few, if any, inspection departments operate on the basis of 100 pct inspection. It's much too slow, ties up an exorbitant amount of labor, and costs too much. The alternative is a statistically-sound method of sampling.

But no sampling method is, or can be expected to be, perfect. A few defective parts are bound to slip through at one time or another.

While the average engineering department is seldom involved in scrap charges, its liability is no different than that of any other major department. It can, for example, be charged with scrap resulting from errors on blueprints, specifications, and engineering instructions and recommendations.

Mostly Overhead — In general, cost reduction in the engineering department concentrates on the reduction of overhead and the more efficient use of equipment and personnel. Scrap, as such, is likely to be a negligible item.

Most of the scrap charges for which the purchasing department is normally held responsible result from errors in paperwork. There may be an occasional instance involving faulty judgment, but far more common are the inaccurately phrased purchase orders.

Taken point-by-point, the Iron Age Management Survey uncovered hundreds of useful details that can be, and are being, applied to scrap charging systems. Even a review of highlights provides convincing evidence of the creative planning that is being showered on this crucial facet of cost reduction.

Scrap is still everybody's problem; but its proper control is starting to show a profit.

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Next time you order cold rolled high carbon wire or spring steel specify Roebling. Strictly on its performance you'll probably become a steady customer from then on. John A. Roebling's Sons Corporation, Trenton 2, N. J.



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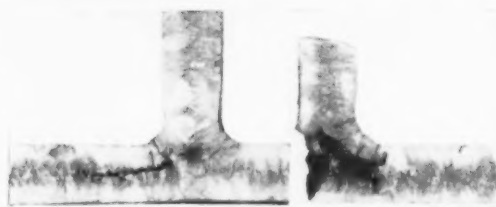
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THE TALE OF TWO TRAYS



THERMALLOY TRAY—hot acid etch made after removal from service. Note that through proper chilling and foundry practice, most cracks are superficial.



COMPETITIVE TRAY—hot acid etch after failure shows severe shrinkage and cracking. This tray was in service *less than half* as long as the Thermalloy tray.

THERMALLOY* QUENCH TRAY GIVES TWICE THE SERVICE LIFE

At a major automotive plant, two sets of quench trays were recently ordered for carburizing shafts at 1650 F. Both were of standard design. One set was cast by Electro-Alloys of Thermalloy heat-resistant alloy—the other was a competitive make.

The illustrations above clearly show the condition of the two test trays . . . after the Thermalloy trays had been in service *more than twice as long* as the competitive make. Use of chills at critical points and proper foundry technique in the Thermalloy trays accounted for their much longer service life . . . by eliminating the shrinkage evident in the

competitive tray. This test, made by the customer, clearly proved the added quality and strength achieved through the use of chills.

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For further technical information on Thermalloy Heat-Treat Trays, write for Bulletin T-227 . . . Electro-Alloys Division, 8013 Taylor Street, Elyria, Ohio.

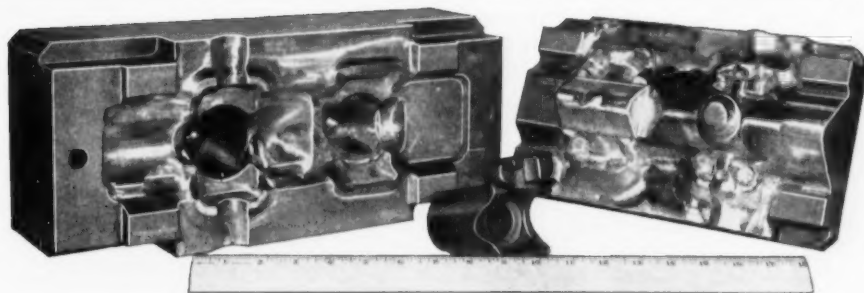
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ELECTRO-ALLOYS DIVISION Elyria, Ohio



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Two station press insert manufactured and used by Ford Motor's Forging Plant in Canton, Ohio. It was made from Latrobe's LPD hot work die steel and is used to produce the Universal Flange Joint in the Drive Shaft Assembly of the 1957 Ford. The material being forged is SAE 1141 which is forged on a 2,000 ton forging press at a temperature of 2240° F.

The top and bottom inserts are heat treated to a hardness of Rockwell C 38-40. Average production for the top insert is approximately 16,000 pieces and for the bottom insert 8,000 pieces.

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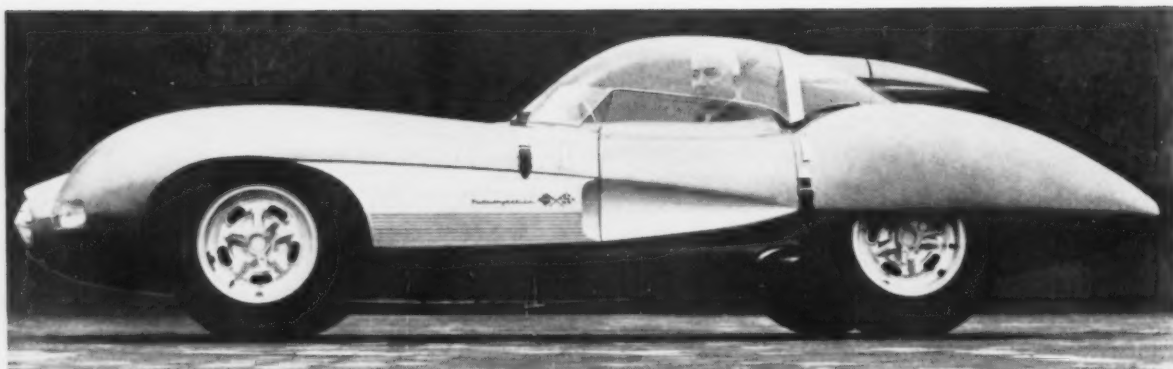
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UNVEILED AND READY: Chevrolet's experimental Corvette Super Sport will test advanced ideas in car design.

What Makes a Super Sport?

Light Metals Make the Difference

Some quarters are wondering why small cars haven't gone over bigger in this country.

Announcement by Chevrolet that it is experimenting with a new small model raises eyebrows.

But GM says the Super Sport is a guinea pig for future passenger cars.

■ Why small cars have never made much headway in the U. S. is a question that has driven many a small car advocate to near distraction. They point to the economic advantages of a small car, its ease of parking, its maneuverability on crowded highways. Why, then, hasn't the American public seen the light?

Those who favor the big auto say that Americans insist on roominess and will not sacrifice it for the advantage of economy. Alfred L. Boegehold, retired manager of General Motors Research staff facilities, has often pointed out that economy can be obtained without sacrificing roominess. His answer is use of aluminum and magnesium.

Enter, Super Sport—Mr. Boegehold says that lighter materials must be used and powerplants developed which have the lowest possible weight per hp. In the light of what has gone before, it is significant to note the announcement by Chevrolet of an experimental Corvette called the Super Sport.

E. N. Cole, Chevrolet general manager, says the car has been built in order to study new ideas to determine whether they might eventually be refined and offered in regular passenger cars. "Instead of substituting these features in test cars on a piece-meal basis," Mr. Cole says, "we hand-built a car around them that will provide concentrated results."

Uses Basic Engine—The backbone of the Super Sport is a tubular frame made of chrome molybdenum steel. Although, it weighs only 180 lb, its ability to withstand shock has allowed designers to use magnesium for the body shell.

Altogether, the experimental job has a dry weight of 1850 lb compared to 2800 lb for the regular Corvette.

The V-8 engine on the car has a 283 cu in. displacement. It is basically the same as Chevy's largest production engine. But through the use of fuel injection and exhaust ports flowing from each of the cylinders, the powerplant can develop over 300 hp.

Trial Runs Coming — Although the car has not been publicly tested for performance, engineers point out that its power to weight ratio is rated a 1 hp for every 6.6 lb. Many of the engine's components are made of either aluminum or magnesium. Aluminum is used for the cylinder heads, the clutch housing, the water pump and the radiator core. Oil pan is magnesium.

Wagons Go Hardtop

Hardtop station wagons may soon become more popular than the standard variety just as the 2-door hardtop is presently more popular than the standard 2-door sedan.

Edward T. Ragsdale, Buick general manager, says the introduction of hardtop styling on the Buick



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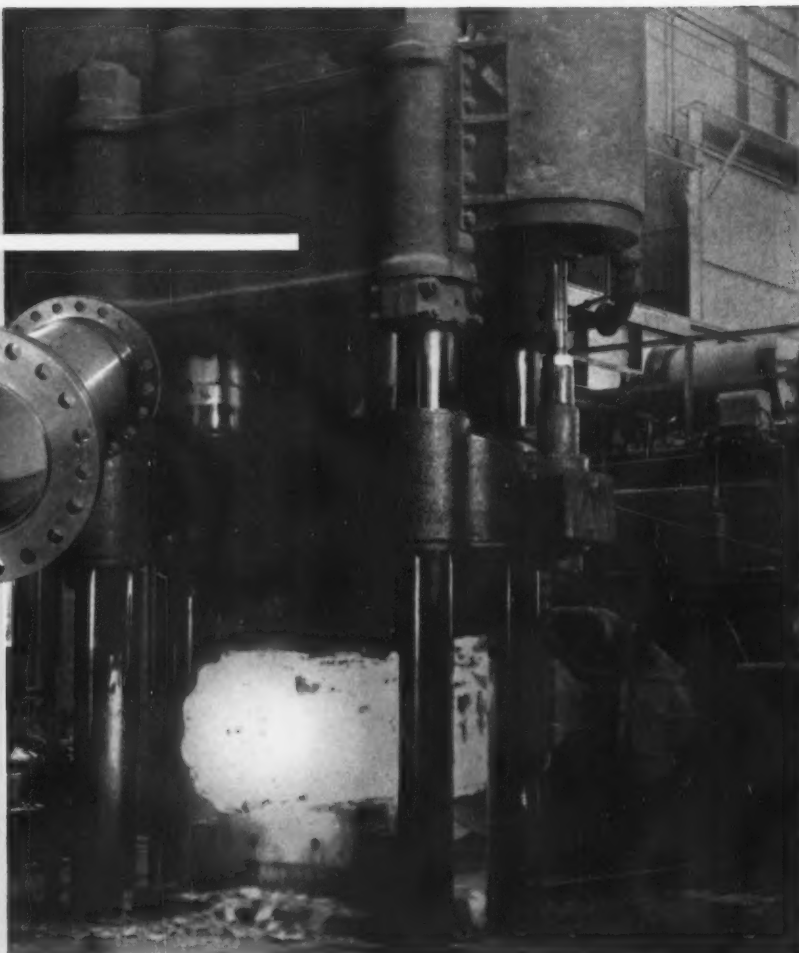
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Automotive Production

WEEK ENDING	CARS	TRUCKS
March 23, 1957*	139,673	22,937
March 16, 1957	141,038	20,866
March 24, 1956	131,287	23,690
March 17, 1956	131,207	23,739
TO DATE 1957	1,662,900	254,600
TO DATE 1956	1,614,600	288,400

*Estimated. Source: *Ward's Reports*

wagon this year has increased its popularity nearly five times.

Mr. Ragsdale says a survey shows that 9 pct of present Buick owners will make their next car a station wagon.

Presently, 70 pct of the company's wagon production is in hard-tops. The division claims that it could have built even more if it had started production earlier.

Hope Grows for Good Second Quarter

How is the second quarter shaping up for the auto industry? To get an accurate answer, it's necessary to consider two factors separately—sales and production.

On the surface, it appears that the April-June period is going to be somewhat slower than industry observers had expected.

Analysis—Look at the sale's picture first. It is unofficially estimated that there were 729,000 new cars in stock as of Mar. 1. This is roughly equal to a 37-day supply for dealers.

Sales for the first 10 days of March were not as big as some automakers had been hoping for. Although it is still too early for an adequate appraisal of the second 10 day period, it is pretty generally realized that the spring selling season that is supposed to be coming along had not materialized up to that time.

Other Side—It doesn't mean there will not be any upsurge in sales. It merely indicates that the season may get started a little later than some people had thought.

This brings us around to the second part of the picture—produc-

tion. Opinion in the Motor City right now is that production in the second quarter will be quite a bit lower than sales.

The reason, of course, is the healthy number of new cars already in stock. So, even if sales do start to increase, production will not necessarily follow unless there is an unusually big demand for cars.

Best guess for auto output in the second quarter is around 1,600,000 units. This compares to production of approximately 1,800,000 cars in the first quarter and represents a drop of a little over 11 pct.

Ahead of '56—Estimates were that second quarter production would be off only 4 to 5 pct from the quarter. Thus, the bears in Detroit are having a field day. However, it must be remembered that the drop in production for the same period in 1956, was between 15 and 19 pct. Even though second quarter output is lower than some people had predicted, it still is much better than it was last year.

From a steel ordering standpoint, the present picture is not too encouraging. First, because of the

expected decline in output and secondly, because of the present steel inventory situation.

It's no secret that the automakers want desperately to cut their inventories to the bone. But this hasn't been as easy as some people thought. Here's why:

Generally, the industry is trying to get inventories down to around 22 days. In some cases, there is an even lower objective of 15 days. However, there have been cases where purchasing agents figured they were getting close to the goal when inventories shot back up again due to production cuts.

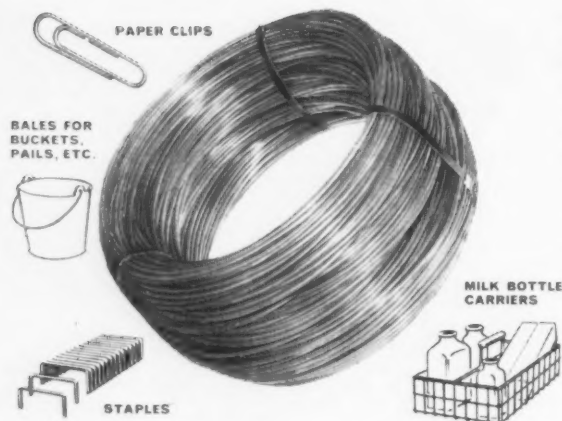
One Possibility—The whole picture could be knocked into a cocked hat. Many people here are still optimistic about the outlook. They concede that April will be a slow month as far as production is concerned but they feel that once the warm weather arrives, wild horses won't be able to hold the industry back.

If this is the case, there will be one big scramble for steel, because the present inventory policy extends to the small automotive suppliers.

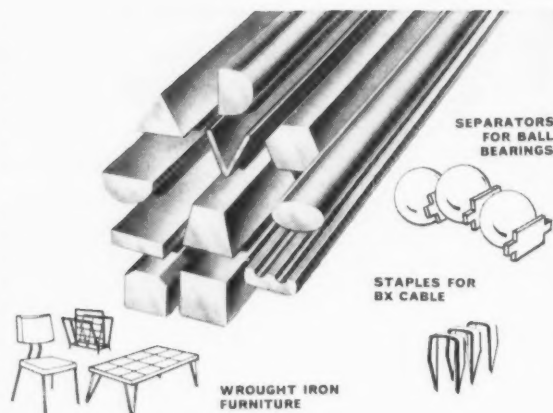
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By J. R. Williams





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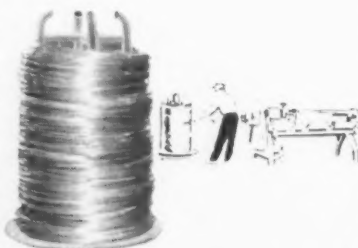
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ECONO-COIL Continuous length wire coils of 2000# to 3000# catchweight, in sizes from 12 gauge through $\frac{1}{2}$ " diameter. Reduces scrap loss up to 90 percent. Shipped on returnable Econo-Coil pallets.

LEVERPAK—FOR FASTER, CLEANER WIRE HANDLING

Saves scrap, reduces down time. Protects wire from moisture, dirt, and the damage of ordinary handling. Permits long, uninterrupted runs of 500# to 650#. Easy to ship and store.



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CONTINENTAL

STEEL CORPORATION • KOKOMO, INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright and special shaped wire. Also Welded Wire Reinforcing Fabric, Nails, Continental Chain Link Fence, and other products.

Defense Budget Will Stand Pat

Armed Forces To Get About \$38 Billion

Some factions in the House will try, but no cuts are in the cards for military spending.

Reason: Voters interested but not angry over king-size appropriation.

■ Government spending for defense will stay substantial, this year and next. The talk about "big cuts in defense spending" is nonsense. Nothing like that is receiving any serious consideration at the Capitol.

When the votes are counted in the Senate and House, the Army, Navy, and Air Force will have gained just about what they asked for. It will add up to about \$38 billion (what Ike asked for back

in January). The lion's share (almost half) will be ear-marked for the Air Force.

Except for some long-range programs, most of the money will be spent in the 12-month period starting next July 1.

Just Talk—Confusing many taxpayers is the reckless talk in the House about cutting as much as \$3.5 billion from the \$38 billion military budget. Chairman Cannon, (D., Mo.) of the House Appropriations Committee, insists he'll chop that much from the total Army-Navy-Air Force budget. He says he'll trim the Air Force by \$1.5 billion, and the Army and Navy by \$1 billion apiece.

Politically, big budget cuts are

just not necessary this year. Many taxpayers are disturbed about the high cost of government, but they are far from boiling mad. Politicians know this.

Military Pressure—The generals and admirals assigned to coax money out of Congress are waging a quiet, but very effective, campaign. They're ignoring Mr. Cannon. They know he's in the minority. They're concentrating on the Senate. There the atmosphere is much more favorable.

The military men are quietly telling senators that they are willing to see "a couple of hundred million" trimmed if need be. To go over the 1 billion mark would be to "invite national disaster," they say.

Small Firms Sell Less to U.S.

■ Share of total military procurement contracts going to small business firms dropped to 16.4 pct during the first half of fiscal 1957. This contrasts with the 19.6 pct they gained during the entire fiscal year of 1956.

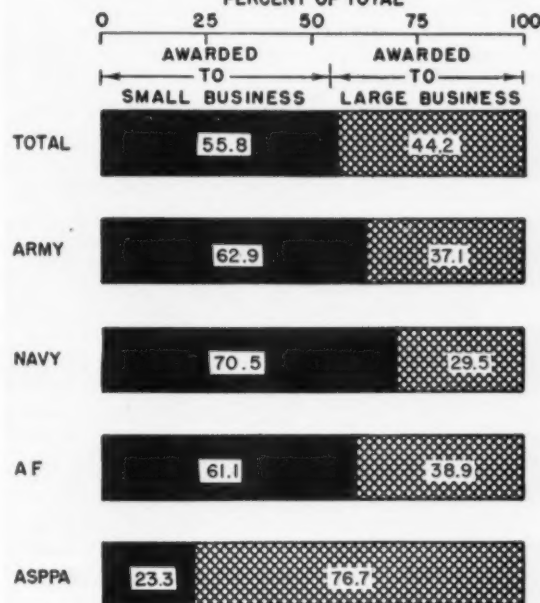
Their part of the total of \$9.8 million was \$1.6 million. This represented about 56 pct of the \$2.8 million estimated as their potential. (Potential includes all procurement actions of \$10,000 which can be offered to small business, as well as all those actions of less than \$10,000.)

Most to Army—The small business potential represented about 10 pct of total Air Force procurement, 23 pct of the Navy's, 69 pct of the Army's and 91 pct of that for the Armed Services Petroleum Purchasing Agency.

This indicates the larger percentages of items for Army use which small business can supply (clothing, building supplies), as contrasted with the heavier equipment needs of the Air Force and Navy.

When only procurement actions over \$10,000 were considered small business got 53 pct of the orders. They missed out on the other 47 pct because on 37 pct their bids were too high and on about 9 pct they did not enter bids.

SMALL BUSINESS SHARE OF THE POTENTIAL PERCENT OF TOTAL





There goes another furnace into the Keokuk "tepee!" The Chief, Princess Wenatchee and Junior are mighty busy preparing for the future. Seriously, big things are going on at both our Keokuk and Wenatchee plants. Demands for Keokuk Silvery Pig Iron, silicon metals—other ferroalloys have been considerable (we are happy to say) and this calls for 2½ million dollars worth of expansion and modernization. In fact, we are now installing several huge ferro-alloy electric furnaces, one of which, we believe, is the largest of its kind ever to be built. This will provide added capacity and along with new materials handling systems and other types of equipment, continued efficiency, quality of product and prompt service will be assured. This, we feel sure, is of interest to all our customers.

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Keokuk, Iowa

Wenatchee Division, Wenatchee, Washington

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SILICON METAL—OTHER FERROALLOYS

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Keokuk Silvery Pig is the superior form of silicon introduction for foundries and steel plants. Car for car and pig for pig, it never varies in quality or content. Keokuk can be handled by magnet and charged by weight or piglet count. Available in 60 pound and 30 pound pigs and 12½ pound piglets. Leading aluminum producers specify Keokuk Silicon Metal for uniform high purity.



Calling All Aircraft Suppliers

Look Westward for Market Opportunity

Plane and missile makers in that area are on the prowl for new sources of supply.

They spend billions every year with some giving 80 pct of their business to smaller firms.

What's more, a giant backlog will keep market active into the 1960's.—By R. R. Kay.

■ Are you sharing in the multi-billion-dollar aircraft and missile market? The major West Coast planemakers are shelling out billions every year for materials, parts, and services.

Have you given any thought to this booming business? All the major plane and missile makers on the Coast are looking for new suppliers and subcontractors. Forty to sixty pct of the planemakers' dollar goes to outside sources.

Last year Lockheed Aircraft paid out \$620 million to 11,000 suppliers in 45 states. North American Aviation bought \$625 million worth of goods and services from 13,000 companies. And it's the same story at Boeing, Convair, Douglas, and Northrop.

Room for All—You don't have to be a giant to work for the planemakers. Some companies parcel out as much as 80 pct to small business. If you can show skill, operate economically, and produce quality, you have a good chance to tap this market.

And what a market! Some 50 pct of the nation's aircraft is made on the West Coast. American-flag airlines, alone, have signed up for 400 jets and propjets. They'll cost \$2.6 billion.

A giant \$9 billion backlog will keep planemakers and their suppliers busy into the 1960's. And stepped-up spending for guided missiles will swell this figure.

Kaiser Enlarges

Kaiser Steel Corp.'s \$113 million Fontana, Calif., works expansion is now about 35 pct completed. And word is out of plans to spend another \$81 million. It will go for a fourth blast furnace with coke ovens, a third oxygen furnace, and plate mill changes.

This double-barrelled program would raise Kaiser's capacity a whopping 91 pct—from 1,536,000 to 2,933,000 ingot tons per year.

The \$113 million project, started June 1956, is due for spring 1958 completion. Increased output will show up in steel plate, sheet, hot rolled strip and tinplate. Some units should be operating this fall.

Others Expand—Building plans are under way for these firms, also: Southern Metal Products, Inc., Scott Diamond Tool Co. and Alloy Steel and Metals Co.



STEEL IGLOO: There are 275 tons of fabricated steel in this protective housing built by U. S. Steel's Western Div. for atomic energy reactor at General Electric power installation in Pleasanton, Calif.

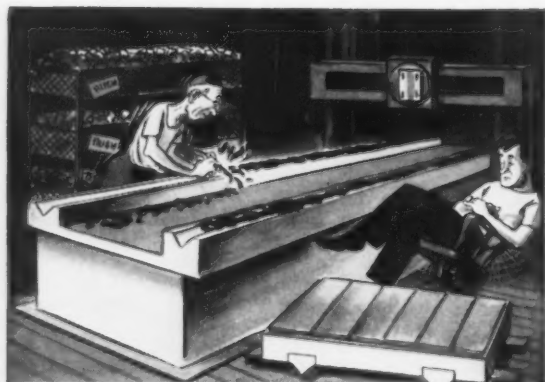


1. Cures "stick-slip" or "jumpy table". When a table gets the "shakes", especially after it has just reversed or when the load is heavy and the speed slow, it's probably suffering from "stick-slip". Remedy—Sunoco Way Lubricant®. Special polar compounds in Sunoco Way Lubricant form a friction-reducing film that keeps a table sliding smoothly under all operating conditions.



2. Doesn't squeeze out. When you use a heavy oil as a way lubricant, you must use a lot of oil to maintain a thick enough film. But, heavy oil squeezes out if the table sits in one position very long. You have a tough time getting the table moving again. Protected by the tenacious thin film formed by Sunoco Way Lubricant, the machine can be idle for a week and it will start easily.

WHY SUNOCO WAY LUBRICANT CAN HELP CURE YOUR MACHINING PROBLEMS



3. Protects expensive ways. Badly scored or pitted ways, caused by inadequate way lubrication, result in lost production and expensive repairs. The high film strength of Sunoco Way Lubricant eliminates the danger of metal-to-metal contact, the chief cause of scoring and way wear. Excellent metal-wetting and non-corrosive properties eliminate rusting and pitting.



4. Approved by more than 55 machine-tool builders. Every major machine-tool builder has tested Sunoco Way Lubricant. It is always approved. In fact, to assure maximum efficiency of their product, many manufacturers ship a supply of Sunoco Way Lubricant with each machine. We'll be glad to send you the list of manufacturers who have approved Sunoco Way Lubricant.

For more information, see your Sun Representative, or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. IA-3

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Government Says It's Ready

M-Day Trigger Program Well Underway

BDSA official says machine tools are basic to national preparedness program.

Tool and die makers are surveyed for possible action.

Builders wonder why budget doesn't specify what military will spend for machine tools.

■ There were times when the metalworking equipment industry got a raised-eyebrows-and-cold-shoulder treatment in Washington.

Not so these days. It got assurance that it was "the basic and fundamental segment of the nation's preparedness program," instead. As such, it's involved in no less than 25 major mobilization deals.

Official Explains—Official scorekeeper for the industry is Wallace E. Carroll, director of the Metalworking Equipment Div., Business & Defense Services Administration, Dept. of Commerce.

Mr. Carroll told representatives of 18 New England equipment producers that at least one of the big mobilization blueprints is well underway. It's the M-Day Machine Tool Trigger Program, with 81 contracts completed or in process.

About 15,500 modern, general purpose machine tools deemed essential will get top priority on builders' schedules if and when the Office of Defense Mobilization blows the whistle.

Will Seek Advice—Mr. Carroll expects the Long Lead-Time Machine Tool Program to be intensified. He told builders of these machines he'd soon be asking for more advice on this project.

The tool and die industry is also

in the charmed circle of preparedness planning. The metalworking Equipment Div. has just completed a survey covering more than 3700 tool and die shops. Findings will probably be announced by mid-year. A similar study of the metal cutting tool industry is underway.

No Tool Breakdown—President Eisenhower's \$72 billion federal budget details virtually every item of Government spending for the 1958 fiscal year. But nowhere do the three military services specify their machine tool plans.

Machine tool industry thought this would be done. Reason: High-level hullabaloo last year insisting that the military get on the ball with realistic programs for replacing obsolete equipment.

The budget does not breakdown the category "Production Equipment and Facilities." Since "facilities" could mean entire new plants, there may be a little or a lot of machine tool money buried there.

Military Share—In all, the Army will spend \$84 million, Navy \$91 million and Air Force \$170 million.



THE EASY WAY: It's just a conventional roller conveyor mounted on the table of this gang drill press. But it simplifies moving a 45-in. long workpiece and an 80-lb fixture from one spindle to another for numerous drilling and counterboring operations at Arrow Tool Co., Inc.

INDUSTRIAL BRIEFS

Paste or Powder?—A new Research and Development Div. formed by Sullivan Powdered Metals, Inc. will work in cooperation with the research laboratories of Aluminum Co. of America. It will be devoted to the development and application of special blends of aluminum pastes and powders for use as pigments in plastics, paper coatings, printing inks and fabric finishes.

New Entry—Entering the field of vacuum melting is the Vaculloy Corp. of Wooster, O. The firm will be engaged in custom vacuum melting of titanium, steel and other alloys for research, laboratory, and development purposes. It will use its own improvement of the consumable electrode double melting technique.

Chemical Expansion—Stauffer Chemical Co. will expand its Niagara Falls facilities for the manufacture of zirconium tetrachloride and silicon tetrachloride. Productive capacity for zirconium tetrachloride will be increased by 40 pct; capacity for silicon by 20 pct.

What's in a Name?—Stockholders of Union Carbide and Carbon Corp. will note a proposal to change the corporation's name to Union Carbide Corp. It will be voted at the annual meeting for stockholders on April 16 at the Waldorf-Astoria. If approved, the effective date will be May 1.

Topp Spot—HRB-San Diego Laboratories, a new division of Topp Industries, Inc., Los Angeles, has opened a research and development facility in San Diego. The new plant will serve the aviation industry under direction of Benjamin R. Gardner, Jr., a senior engineer on the technical staff of Haller-Raymond and Brown, Inc.

Titanium Documentary—Titanium development of airframe parts is reported in a motion picture released by Boeing Airplane Co., Seattle. Unclassified and running eighteen minutes, the 16 mm color sound film documents Boeing achievements during a two-year production research program in hotforming, heat-treating, machining, and assembling test parts and structures.

Ingots for Chile—Koppers Co., Inc., Pittsburgh, has a contract to design, purchase certain equipment, and supervise erection of an open-hearth furnace for Compania de Acero Del Pacifico of Santiago, Chile. The furnace will have a capacity of 200 metric tons. When completed, the furnace will be the fourth at the Chilean firm's Huachipato works. At present there are three 100 metric ton furnaces in operation.

Option Play—A proposal to offer common stockholders of Reynolds Metals Co. additional common shares is being filed with the Securities and Exchange Commission in Washington. The offer is part of a \$150 million financing program for construction of Reynolds' new primary aluminum plant near the St. Lawrence Seaway project and for expansion of alumina, sheet and plate fabricating facilities.

Power for the Plains—The U. S. Army Corps of Engineers has placed an order for hydraulic turbines with Allis-Chalmers Mfg. Co. for installation of seven units in the Oahe Reservoir project on the Missouri River near Pierre, S. D. Value of the turbine contract is in excess of \$10 million. When installed the units will provide 900,000 additional horsepower to the west north central section of the country.

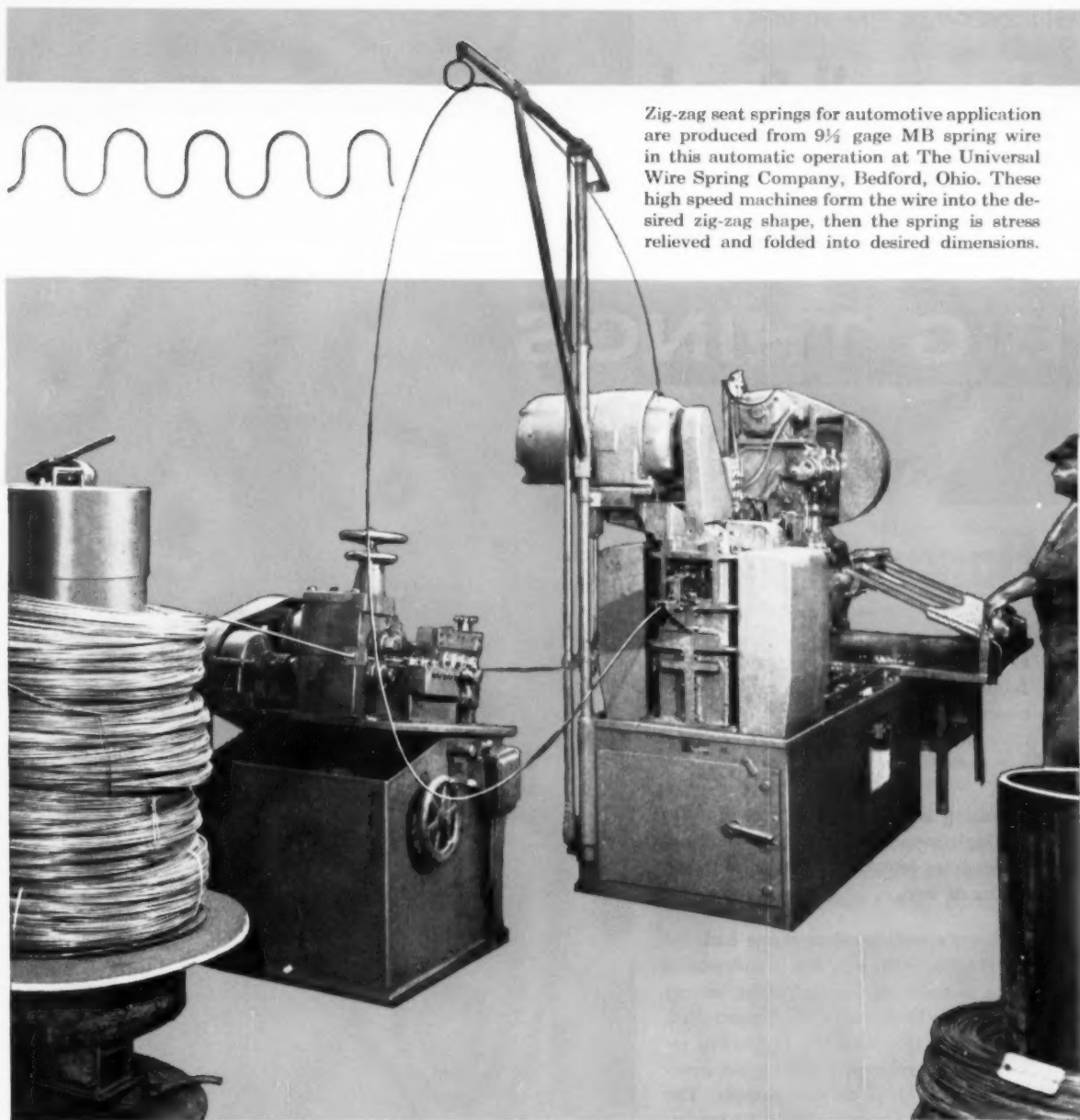
Meet the Presses—A. V. Wiggins Co., Inc., has been appointed Syracuse, N. Y., area dealer for presses made by Hamilton Div. of Baldwin - Lima - Hamilton Corp. Wiggins will sell all types and sizes of Hamilton mechanical and Baldwin hydraulic and compacting presses, including metal powder and plastics compacting types.

Weather Forecast—A development contract for radiotheodolite has been awarded to Servo Corp. of America for the Dept. of Commerce's Weather Bureau. Under this \$1,258,845 contract, Servo Corp. will develop an instrument for automatically tracking a balloon-borne radiosonde transmitter of 50 milliwatts for a distance of 100 miles.

Wide Screen View—"On The Move", a color-sound movie, is being released by Baldwin-Lima-Hamilton Corp.'s Construction Equipment Div. The 28 minute, 16 mm film deals with the subject of transportation, points out the roles played by shovels, cranes, and other road building equipment.



"Miss White, will you ask for a raise for me?"



Zig-zag seat springs for automotive application are produced from 9½ gage MB spring wire in this automatic operation at The Universal Wire Spring Company, Bedford, Ohio. These high speed machines form the wire into the desired zig-zag shape, then the spring is stress relieved and folded into desired dimensions.

AUTOMATIC production requires AUTOMATIC quality of J&L SPRING WIRE

Every coil of J&L spring wire is thoroughly tested for uniformity of physical and dimensional properties. This uniformity of J&L's famous Mastercraft, hard-drawn MB or Electromatic oil-tempered MB spring wire speeds production, reduces rejects, in automatic operations.

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Castings made in the Ingersoll-Rand foundries vary in weight from a few ounces to 30 tons. But one thing that never varies is the quality of I-R castings. For over 30 years, Hanna Furnace has been furnishing Ingersoll-Rand with ever-increasing amounts of pig iron that has the high metallurgical qualities and exact analyses required for its engineering grades of iron.

Hanna's wide product range includes the Hanna 38-lb. pig, the foundryman's favorite standard, in all grades, silvery and HannaTite, our special controlled, close-grain iron. Also the HannaTen ingot, a 10-pounder with finer grain structure and no free carbon pockets. The HannaTen also is available in all grades, silvery and HannaTite.

Our customers know that Hanna and its representatives are eager to be of service to them.



Turbine castings, totalling 55 tons, being checked in a test assembly after final machining at the Ingersoll-Rand plant at Phillipsburg, N.J.



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Robert H. Lucas, elected executive vice president, Pittsburgh Steamship Div., U. S. Steel Corp.

A. D. Mitchell, elected president, The Waterbury Farrel Foundry & Machine Co.; **R. C. Bannon**, Tadeusz Sandzimir and **F. S. Van Valkenburg**, elected vice presidents; **E. S. Wotkins**, elected secretary; **H. C. Griggs**, elected asst. secretary; **A. D. Patterson**, elected treasurer; **J. A. Gute**, named asst. treasurer; **T. E. McLaughlin**, named comptroller.

James W. Kinnear, Jr., elected executive vice president, Tennessee Coal & Iron Div., U. S. Steel Corp., Birmingham, Ala.

W. H. Holman, appointed staff assistant to the asst. vice president, steel plants, Wheeling Steel Corp., Wheeling, W. Va.



S. J. Hunt, elected vice president, engineering, National Automatic Tool Co., Inc., Richmond, Ind.

Peter J. Schoenster, elected executive vice president, manufacturing **Alfred Hofmann & Co.**

Bernard Levine, elected vice president, **Norden - Ketay Corp.**, Stamford, Conn.

Carl J. Koepke, elected vice president, sales, **Bellford Metal Products, Inc.**, Cleveland.

Franklin H. Kissner, elected executive vice president and director, **The Dyson Corp.**, New York.

Orville M. Dunning, elected vice president, **Airborne Instruments Laboratory**, Mineola, N. Y.



Robert L. Larson, appointed general manager, Indianapolis steel service plant, **Joseph T. Ryerson & Son, Inc.**, Chicago.

Carl E. Nelson, elected treasurer and controller, **Union Steam Pump Co.**, Battle Creek, Mich.

Charles C. Morgan, named general superintendent, Columbia-Geneva Steel Div.'s Pittsburg (Calif.) Works, U. S. Steel Corp.

John G. Frischkorn, appointed asst. sales manager, Cleveland Tramrail Div., **The Cleveland Crane & Engineering Co.**, Wickliffe, O.

Carl B. Wooten, named executive vice president, **Trecker Aircraft Corp.**, Milwaukee.



Alvin J. Mistler, elected vice president, **Armco Drainage & Metal Products, Inc.**, Middletown, O.

D. H. Munro, named asst. comptroller, **Atlas Steels Ltd.**, Welland, Ontario.

Wyman Goss, named manager, phenolics product plant, **General Electric Co., Chemical & Metallurgical Div.**, Pittsfield, Mass.

Robert Mercer, named district manager, West Coast region, **Lamson Mobilift Corp.**, Portland, Ore.



Delbert J. Stoker, elected vice president, **Armco Drainage & Metal Products, Inc.**, Middletown, O.

Randall E. Campbell, named superintendent, south warehouse operations, **Joseph T. Ryerson & Son, Inc.**, Chicago; **Walter K. John-**

son, named superintendent, structural fabricating shop, also at the south warehouse.



Charles W. Meyers, named director, Product Planning & Development Div., American Steel & Wire's General Sales Dept., U. S. Steel Corp., Cleveland.

D. W. Kaufmann, named manager, marketing, Rem-Cru Titanium, Inc., Midland, Pa.

A. E. Sneden, named product manager, Wire and Cable Div., National Electric Products Corp., Pittsburgh.

Allan B. Fredhold, named plant manager, General Logistics, Pasadena, Calif.

Raymond E. Burton, named asst. director, marketing, Koehring Co., Milwaukee.



Charles D. Gabor, named asst. chief engineer, Harbison-Walker Refractories Co., Pittsburgh.

Frank P. Lovewell, appointed budget director, Dana Corp., Toledo, O.

Jackson Krall, appointed sales manager, Malleable & Grey Iron Works, Milwaukee.

Roger H. Brown, named sales manager, Industrial Div., Warner Electric Brake & Clutch Co., Beloit, Wis.

Fritz Walters, named sales and service manager, Detroit Tap & Tool Co., Base Line, Mich.; **Wilmo Weevie**, named asst. sales manager.

Andrew A. Kucher, appointed director, engineering staff, Ford Motor Co., Dearborn, Mich.



Captain John N. Boughman, named director, industrial relations, Pittsburgh Steamship Div., U. S. Steel Corp.

R. M. Casper, named general manager, Nuclear Power Div., Allis-Chalmers Manufacturing Co.

G. C. Van Heusden, named district manager, New York warehouse and office, Maspeth, L. I., Chase Brass & Copper Co.

John G. Hixson, named manager, technical services, Rochester Div., Consolidated Electrodynamics Corp.

Richard P. Simmins, named manager, processing, Toronto, O., plant, Titanium Metals Corp. of America.

Bernarr F. Hayden, named contracts administrator, Advanced

BUILD A GAGE INSTALLATION TO SUIT YOUR NEEDS . . .

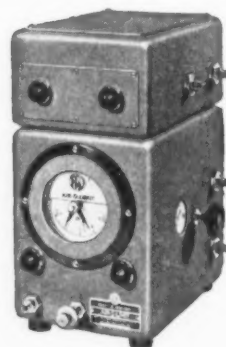
with these packaged, on-the-shelf P&W Air-O-Limit Light Signal Units. Can be used to signal operator or to provide feed-back impulse for fully automatic process control.



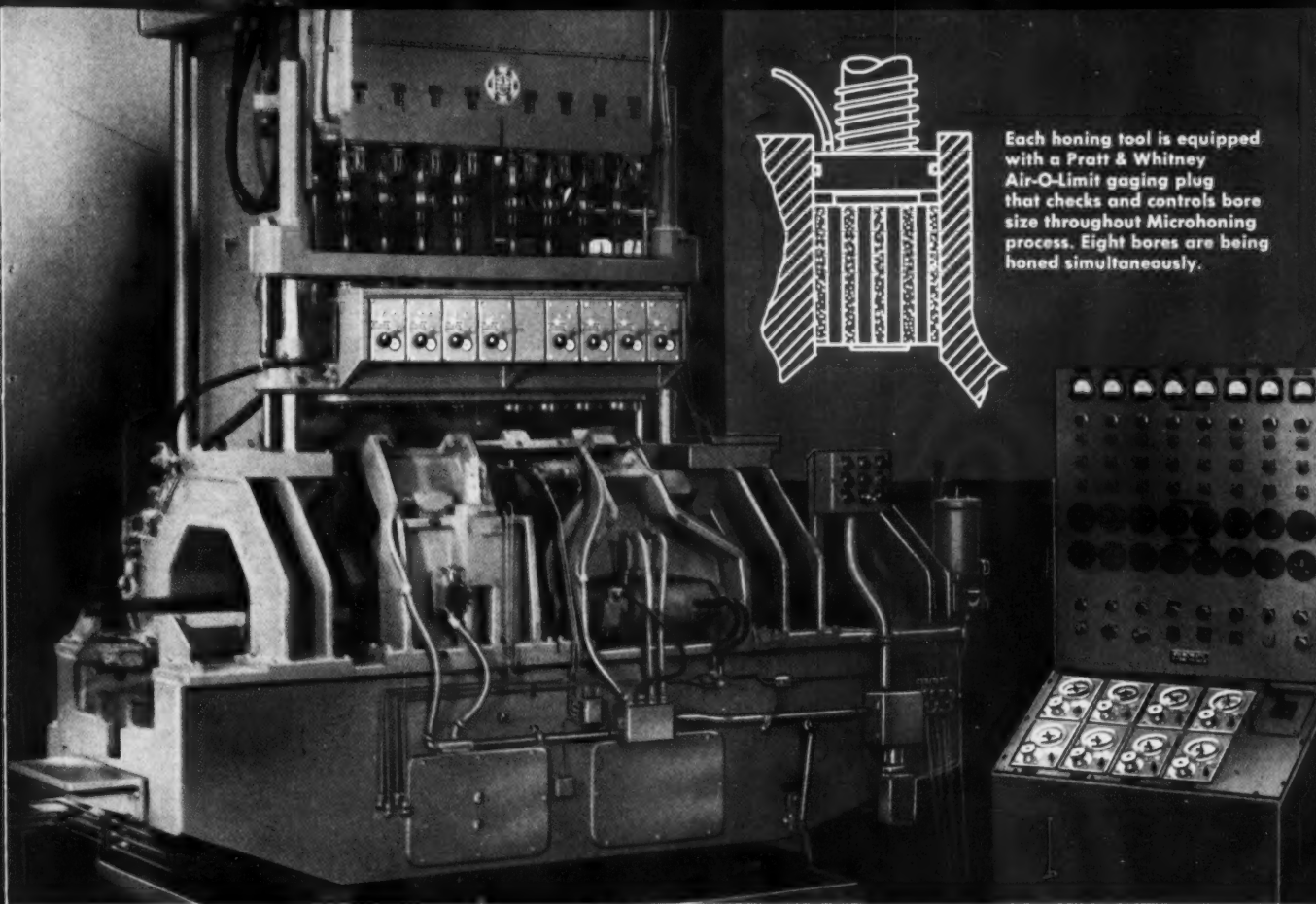
BASIC 2-LIMIT UNIT . . . indicates high and low tolerances. Suitable for sorting and other "yes-or-no" control applications.



3-LIMIT UNIT . . . especially suited for grinding and similar operations. Indicates or automatically controls such conditions as: "Fast Feed," "Slow Feed," and "Spark-Out."



4-LIMIT UNIT . . . similar to 3-Limit Unit, but provides greater control scope. Indicates or controls such conditions as: "Approach High Limit," "High Limit," "Approach Low Limit" and "Low Limit."



Each honing tool is equipped with a Pratt & Whitney Air-O-Limit gaging plug that checks and controls bore size throughout Microhoning process. Eight bores are being honed simultaneously.

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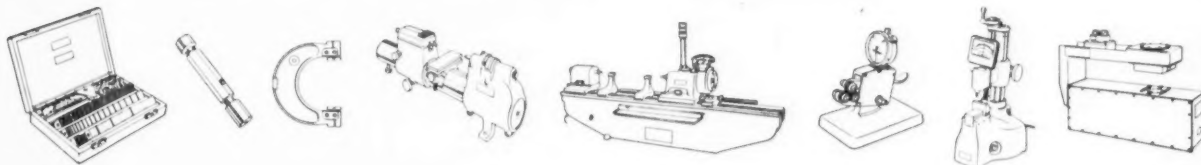
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John McDowell, named plant controller and **John Dys**, named manager, Oakland, Calif., plant, **Hubbard and Company**, Pittsburgh, Pa.



Elmer A. Trask, named Cleveland district manager, Wire Rope and Aircord Div., **John A. Roebeling's Sons Corp.**

Robert J. Casterton, appointed district manager, New York office, Spang-Chalfant Div., **The National Supply Co.**

William B. Downes, named manager, Stainless Steel Sales Div., **Crucible Steel Co. of America**, Pittsburgh.

Philip P. Percich, appointed asst. manager, Hose Sales Dept., **Good-year Tire & Rubber Co.**, Akron, O.

Charles E. Bryan, named asst. product supervisor, electrical conductors, **Reynolds Metals Co.**, Louisville, Ky.

Arthur Sternberg, appointed general manager, **Solar Permanent Co.**, Div. of U. S. Industries, Inc.

James J. Moore, Jr., appointed North Central area representative, Industrial Products Div., **Pioneer Rubber Co.**, Willard, O.

Jack Southwell, appointed superintendent, plant one, **Tapered Air Products Corp.**, Lynwood, Calif.



Donald E. Lake, named sales manager, Ohio Div., **Associated Spring Corp.**, Dayton, O.

a maker of milled components.

William F. Ross, named marketing manager, **Ipsen Industries, Inc.**, Rockford, Ill.

John T. McCarley, named general manager, West Coast manufacturing plant, Materials Handling



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A hole in steel is a "nothing-at-all" with engineered sides. And many costly things can happen to it: drilling, broaching, reaming, tapping, counterboring, countersinking, and so on. What's more, holes weaken the product, necessitate extra bosses, cause possible leaks, create corrosion pockets.

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Donald C. Campbell, named works manager, **The Skinner Chuck Co.**, New Britain, Conn.

Dr. Robert Clark, named chief plant metallurgist, **Atlas Steels Ltd.**, Welland, Ont.

Melvin A. Hanson, appointed chief engineer, Magnus Metal Div., **National Lead Co.**, Chicago.

R. L. Peckinpaugh, named sales engineering representative, Northern Ohio, **Aurora Metal Co.**, Aurora, Ill.

T. Howard Adair, named manager, **Atlas Titanium Ltd.**, Welland, Ont.

Arnold Sherman, named product engineer, Electronics Div., **The Peerless Electric Co.**, Warren, O.

Thomas E. Wood, named director, programming and development, **Flick-Reedy Corp.**, Melrose Park, Ill.

Walter Ahlgrim, named manager, Steel Mill Div., **Phoenix Manufacturing Co.**, Joliet, Ill. He was formerly superintendent of the division.



John H. Biggs, named district sales manager, Machine Tool Div., **Brown & Sharpe Mfg. Co.**, Providence, R. I.

Edward R. Schick, named sales manager, **The Union Tool Corp.**, Warsaw, Ind.

Lawrence De Giso, named sales representative, Chicago, **Lewis-Shepard Products, Inc.**, Watertown, Mass.

James Windross, appointed chief engineer, **Phoenix Manufacturing Co.**, Joliet, Ill.

David W. Bonnar, named senior engineer, major accounts, Sales Dept., **Clearing Machine Corp.**, Div. of U. S. Industries, Inc., Chicago.

Frank E. Chase, named sales manager, Glendale Div., **Consolidated Electrodynamics Corp.**, Pasadena, Calif.

P. J. Hughes, appointed asst. to works manager, **Midvale-Heppinstall Co.**, Philadelphia.

John C. Wallace, elected vice president, engineering, **Walworth Co.**, New York.

James R. Becker, named asst. sales manager, aircraft pumps and

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... to hang, handle or hold.



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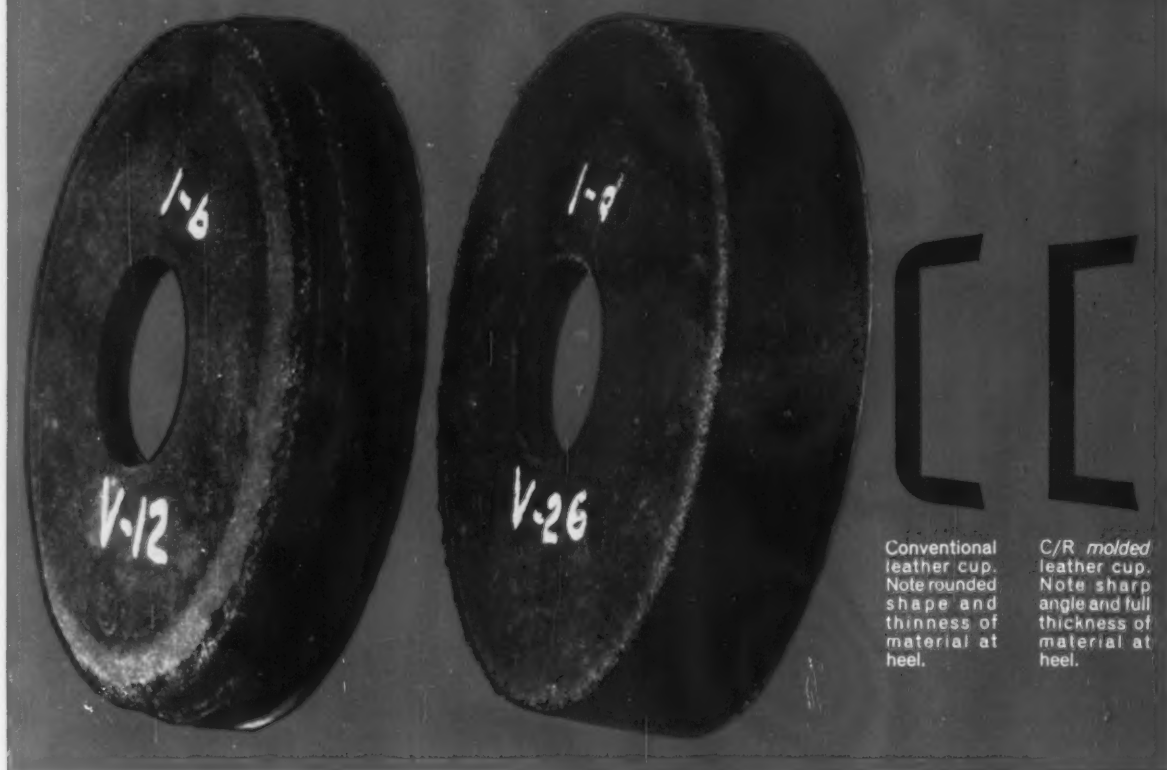
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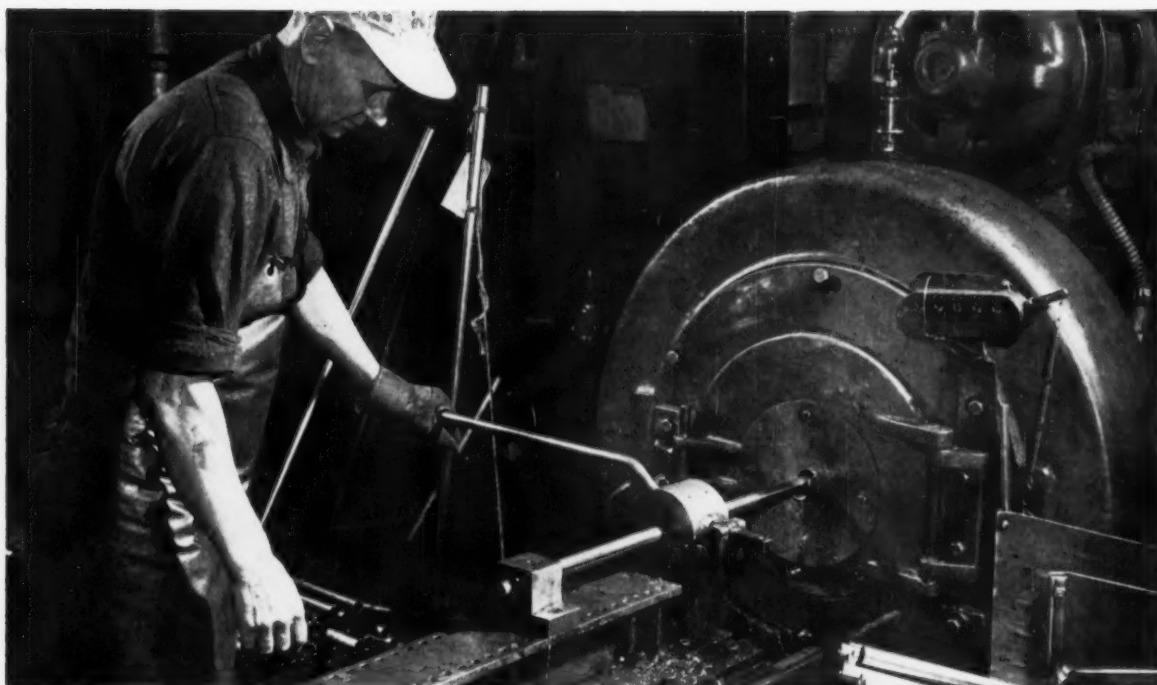
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QUICK WORK: Swaging tapers the legs of modern tubular steel furniture quickly, without wasting any metal.

Modern Swaging Packs Surprises As a Production Technique

Production men are applying a lot of smart thinking to the swaging process these days.

It seems that with a little imagination, this can be quite a versatile manufacturing and assembly method.

These case histories may be surprising, but they'll give you plenty to think about.

By E. J. Egan, Jr.,
Machinery Editor

■ The metalworking industry is in a hurry, more so than ever before. As a result, certain production techniques that were quite satisfactory in the past are being discarded in favor of newer, more modern methods. This means that metals and alloys that were once "too hard to work" are now being used in applications previously thought impossible.

It also means that, in many cases, difficult assembly operations have been eliminated, yet the same (or even better) end products are obtained at substantially lower costs.

These are some of the effects created by an industry in a hurry. The cause? It's usually some type

of versatile precision production tool that eliminates waste, improves the appearance and properties of the work, and imparts desirable characteristics to stubborn metals—to say nothing of boosting production.

Takes Imagination — One such precision tool is the rotary swaging machine. Until recently, the swager performed such unimaginative jobs as that of pointing wire prior to drawing. But today, it plays an important part in a wide variety of fabricating and assembly operations.

For example, it can transform non-ductile, crystalline aluminum-lead alloys into putty-like material

Close-tolerance production is one of the major advantages.

suitable for cold working; it can produce some finished assemblies neater, faster, and more economically than is possible by any other means; it can transfer outside contours to the inside of relatively thick-walled tubing.

Finally, and perhaps most significant, is the fact that in many instances swaging proves to be the only feasible method of manufacture.

Although swaging is basically a forging process, it is in no sense a "rough" forging operation. It is not a substitute for the blacksmith's brawn that produced such rugged results as the iron-clad wagon wheel. On the contrary, the only similarity in both cases lies in the fact that metal is shaped by a series of rapid hammer blows.

With the precision dies used in modern swagers, the hammer blows are only the means of transferring the fineness of the dies to the fin-

ished work. The extremely close tolerances that these machines and dies produce in workpieces is one of the chief reasons why more manufacturers are finding new applications for the swaging process.

How were these new applications developed? Simply by a growing realization of just how versatile the swaging machine can be.

As a leading producer of rotary swaging equipment, The Fenn Mfg. Co., Newington, Conn., can point to many examples that prove the versatility of the process. The following case histories show some of the ways in which swaging has solved unique problems posed by industry.

In one instance, a manufacturer had been machining small hydraulically-actuated plungers from an aluminum-lead alloy. Basically, the solid plunger was circular at any cross section, though of varying diameters. In addition to the material waste involved, tool breakage costs ran high because of the brittleness of the alloy.

Fenn engineers requested samples of the alloy and complete production prints of the plunger for dimension and tolerance studies.

They conducted exhaustive tests to determine the effects of swaging on the mechanical properties of the material. The first swaging reduction of the several that were required made the samples ductile enough so that they could be formed into tight loops without fracturing.

These tests showed the manufacturer that the plungers could be produced by swaging. As a result tool breakage and scrap costs were eliminated, grain structure was refined and surface finish was improved. The increased ductility of the swaged plungers also made subsequent operations easier. Fig. 1 shows the experimental reductions taken on the aluminum-lead alloy.

The production of copper welding-torch tips by swaging has also proved highly successful in eliminating a tricky drilling operation. Each finished tip, approximately 4 in. long, requires drilled passages throughout its entire length. The passages are not parallel but are angled inward toward the axis of the piece as shown in Fig. 2.

This was formerly a most difficult drilling operation; drill breakage was high and passage accuracy critical. But adapting the end product to the swaging process solved these costly problems.

The required straight and angled holes were first drilled through a copper slug $1\frac{1}{8}$ in. in diam. but only $1\frac{3}{16}$ in. long. Piano wire mandrels were then inserted in the holes and the complete assembly reduced in diameter by swaging. A four-step reduction brought the work to within 0.010 in. of the required OD.

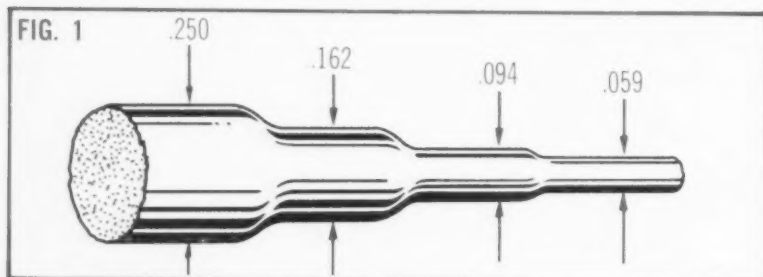


FIG. 1: Progressive swaging reduces the diam of aluminum-lead alloy wire.

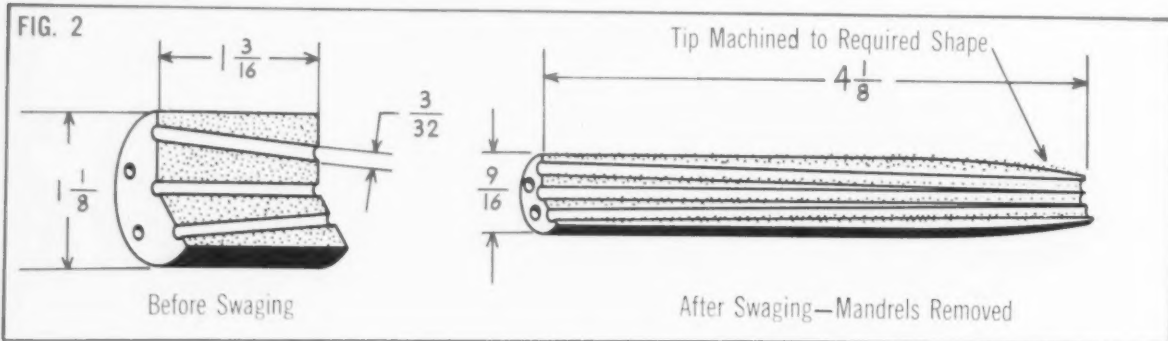


FIG. 2: Welding torch tips are precision-swaged in one minute each. Wire mandrels maintain hole dimension.

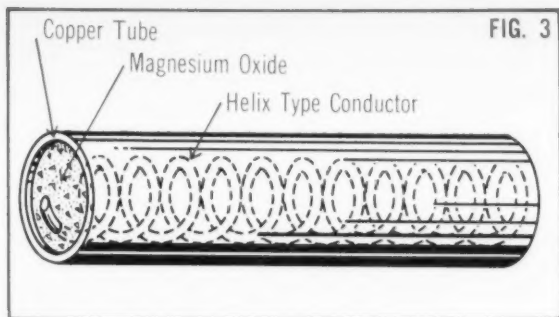


FIG. 3: (Above) Swaging assembles components of heating elements quickly and economically.

FIG. 4: (Right) Swaging pins bushings firmly inside pre-drilled steel tubes. Former practice of inserting tools to do the job was very difficult.

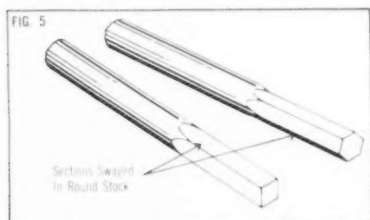
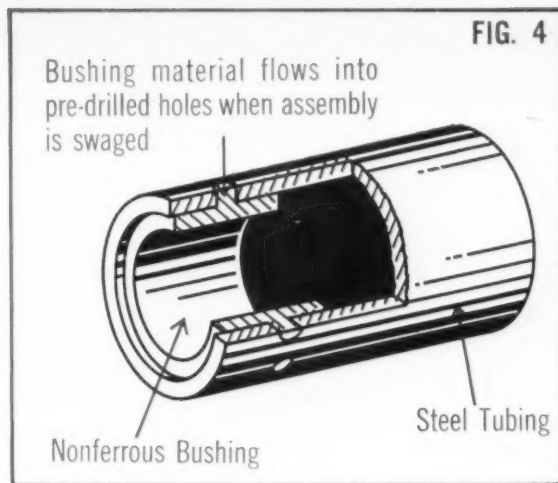
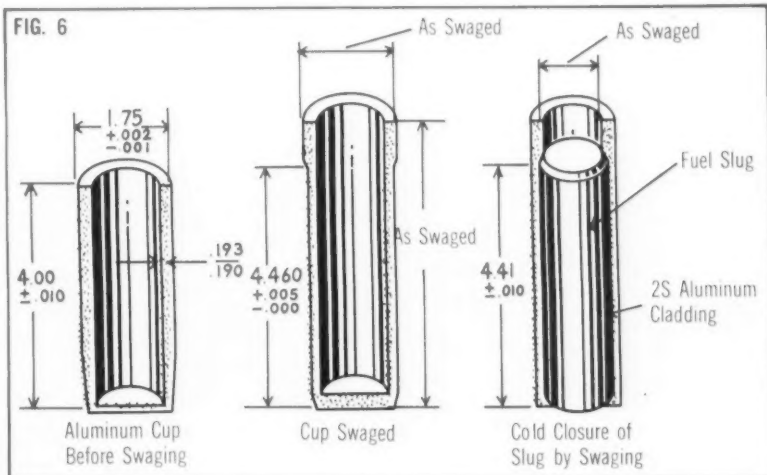


FIG. 5: (Above) Time and material are saved by swaging square and hexagonal sections from original round bar stock.

FIG. 6: (Right) Aluminum-clad fuel elements for nuclear reactors are prepared by swaging cups and fuel slugs into a tight bond.



The torch tip was then peened to permit easy removal of the mandrels and finally machined to the required external shape. The swaged tip not only exhibits accurately spaced holes at the nozzle end, but each passage is of uniform diameter throughout the entire length.

Heating elements used in both commercial and industrial applications are also assembled quickly and economically by swaging together the essential components of the elements.

In this operation, a length of copper or stainless steel tubing is first sealed at one end and supported vertically. Next, a helical central conductor is inserted and suspended concentrically with the tube.

The tube is then vibrated while

magnesium oxide is funneled in around the conductor, after which the open end of the assembly is swaged in a long-die type of machine. This reduces each component in proportion and further compacts the oxide.

Swaging down to the finished dimensions is done in steps so that the convolutions of the helix are not ruptured. Fig. 3 shows the components of the finished heating element.

Swaging also aids the production of gold wedding bands which have their origin in centrifugally cast tubes six to eight in. long. Casting the tube results in a coarsely crystalline grain structure which formerly made subsequent operations somewhat complex and costly. Now, however, swaging the tubes

over an arbor refines the grain structure to the point where it is only necessary to "slice" rings off.

Another case history shows that the assembly of nonferrous bushings inside lengths of $\frac{5}{8}$ in diam steel tubing formerly presented a problem because of the size and properties of the tubing. Further, the location of the bushing inside the tube made it difficult to insert tools and fixtures for pinning the assembly.

Because the bushing was nonferrous material it was decided that swaging would fasten it securely in position. To accomplish this, a slightly oversize steel tube was drilled through around the circumference at the location of the bushing and the bushing inserted.

The assembly was then swaged

In many cases, swaging is the preferred cost-saving technique for fabricating hollow cylindrical parts from tubing.

over a mandrel to hold the required bushing ID. The swaging operation caused the bushing material to flow into the drilled holes of the steel tubing thus forming a firm, positively locked assembly, shown in Fig. 4.

A common problem of many manufacturers is the requirement for stock that changes in cross sectional shape from round to hexagonal or from round to square. To start with hexagonal or square stock and machine the required round section means a considerable waste of material.

Swaging solves this problem by producing the required hexagonal and square sections from relatively inexpensive round stock with absolutely no waste. Essentially, it requires a four-die machine with a special spindle device which rotates the round stock (held in a fixture) at the same speed as the spindle.

When the work is advanced, the

dies hammer on the same section of stock, thereby producing the change in cross section. The pieces are simply cut to the required length and the procedure is repeated. Fig. 5 shows the transition in section from round stock.

In keeping with its other modern applications, swaging also finds use in the field of atomic energy, especially in producing aluminum-clad, slug-type fuel elements which are used in water-cooled reactors.

The critical step in the manufacture of a cylindrical fuel element is the cladding of the slug; this must result in a perfect bond. Defective bonding could result in costly shutdown of the reactor due to contamination.

Since both the uranium slug and its aluminum container are often cylindrical in shape, forming the aluminum cup is a "natural" for the swaging process.

As shown in Fig. 6, an aluminum cup 4 in. long x $1\frac{1}{4}$ in. in diam and with a wall thickness of 0.100 in. is swaged down to a narrower, longer shape. The fuel slug is inserted and the assembly swaged again to produce the necessary tight bond between fuel element and can. This is followed by a cold closure operation to seal off the fuel element.

Other uses for swaging are often found where hollow cylindrical parts were formerly machined from bar stock. Substantial cost savings can often result when these parts are fabricated from welded tubing. There is a maximum wall thickness to diameter ratio obtainable on such tubing, but this insufficiency can be built up to the desired gage by swaging.

The swaging process also refines the weld area of the tubing. This preferred method of fabricating hollow cylindrical parts results in the following savings: (1) lower cost raw material, (2) a drilling opera-

tion eliminated, and (3) no wasted material in the form of chips.

Varying internal diameters throughout a specified length of tubing can also be achieved by swaging without the scrap costs and special tools normally associated with machining. Fig. 7 shows a typical part wherein wall thickness has been built up and external to internal contour transfers have been achieved by swaging.

The Fenn Co.'s files also show how a flexible and porous type of powdered metal tubing can be improved by swaging.

One application in particular required the use of such tubing for self-lubricated bushings. However, tests for strength and lubricant bleed rate showed the material to be too porous. The lubricant could not be contained for any appreciable length of time which meant excessive maintenance.

A thorough investigation showed that swaging could reduce this porosity, thus making it possible to control lubricant bleed at the required rate. This also extended the wearability of the bushing beyond the design requirement.

Judging from the foregoing examples, modern rotary swaging offers cost-conscious and efficiency-minded production men a lot to ponder on.

Not the least among such considerations is the fact that swaging machines do not require highly skilled operators. In fact, where extra thrust is needed for feeding work into dies which have large-angle tapers, a variety of feeding devices is available.

Rack-and-pinion type manual feeds reduce vibrational shock and operator fatigue. Other feeding mechanisms are completely automatic, and are pneumatically or hydraulically operated. With these systems, one man is well able to attend several machines.

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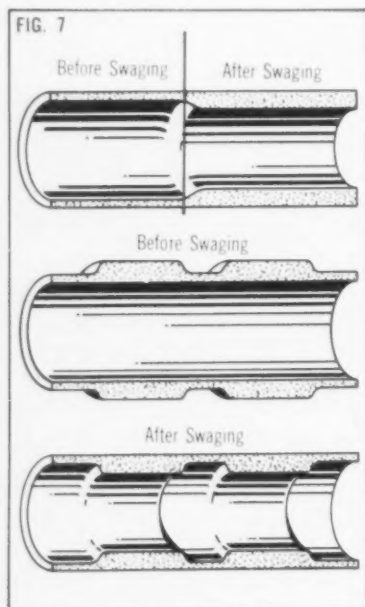


FIG. 7: Swaging is an effective way to increase tubing wall thickness (top) and to transfer wall contours (bottom).

Get More Protection From Galvanized Coatings

By A. T. Baldwin, Consultant, and W. H. McMullen, Metallurgist,
Hanson-Van Winkle-Munning Co., Matawan, N. J.

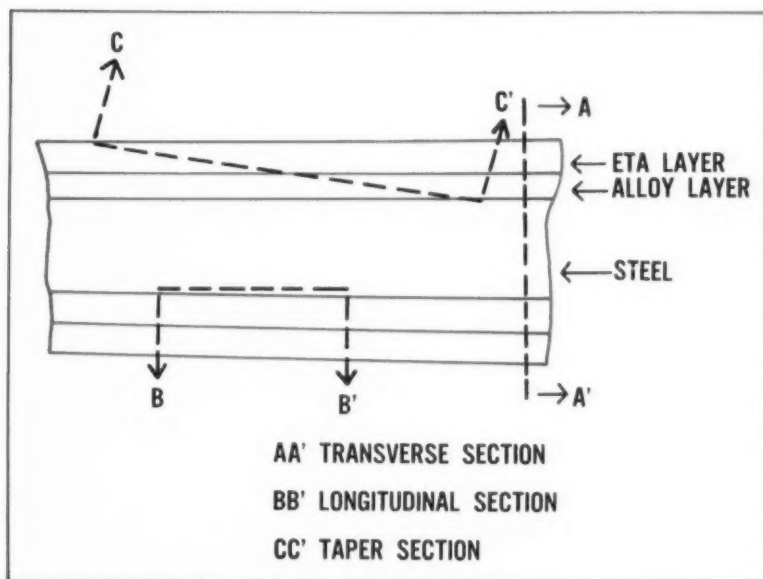


FIG. 1: Metallurgical sections for accompanying photomicrographs were secured as shown here.

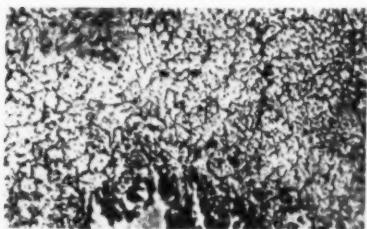


FIG. 2: Taper section of 0.04 pct carbon steel galvanized wire (charcoal-wiped) at (800x) (8x).

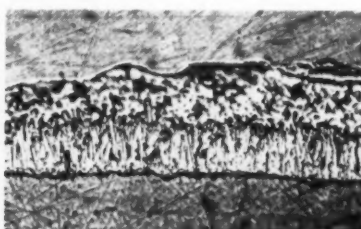


FIG. 3: So-called palisade layer appears here. Zinc coating is on 0.6 pct C steel wire. (800x)

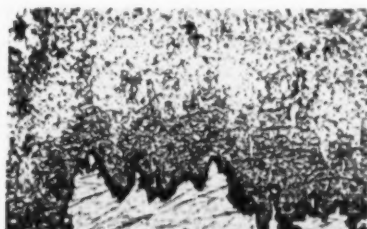


FIG. 4: Compare this tapered view with Fig. 3, both from the same 0.6 pct carbon steel wire. More detail is seen. (800x)(8x)

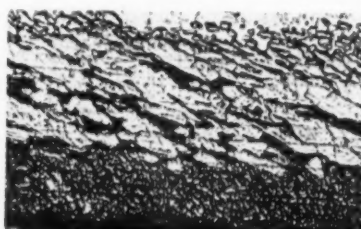


FIG. 5: Flowing of alloy layers shows in longitudinal view of 0.6 pct carbon steel drawn galvanized wire. (1200x)

Galvanizing gives good protection to steel against corrosion. Yet, it's worthless if the zinc coating cracks and peels when formed or used.

The coating has to be ductile, adhere tightly. And you want it uniformly thick for long-lasting protection.

Now, new metallographic studies suggest ways of making the thicker zinc coatings better.

■ There's a seeming contradiction in galvanizing. Two factors appear to work against one another. Past efforts to reconcile them have been successful, but not entirely so.

Now new data suggests that even better galvanized coatings are possible.

The contradiction arises when galvanizers try to produce a thick but ductile zinc film on steel. To endure stamping and forming stresses without peeling or flaking, the coating must be ductile and adhere tightly to the base metal.

Longer Protection—You also want a thick zinc coating because it inhibits corrosion longer. This because the zinc corrodes at a steady rate under standard conditions, sacrifices itself to protect the steel base. In the same service, the thicker zinc films protect longer.

But the thicker the zinc film, the more slowly it cools on removal from the liquid bath. So with thick coatings, you risk the presence of zinc-iron alloys which form under such conditions.

Zinc-iron alloys are more brittle than pure zinc. They will often

crack and peel on bending, stamping or forming of the ferrous under-surface. Separation of the galvanized layer from its base leaves the way free for corrosion to begin.

Despite this constant hazard, galvanizers do a better job today than ever before. The hot galvanizing methods now used with many products give coatings which are both ductile and adherent.

Galvanized sheet and strip can be formed under severe conditions. Wire can be drawn to smaller diameters than in the past. Zinc coatings on castings, forging, and stampings adhere better than ever before.

Better Methods—Some of the results arise from radical changes in the galvanizing process. One such change is use of 0.10 to 0.20 pct aluminum in zinc baths for galvanizing strip steel. Deeper insight into what happens in standard baths also has helped upgrade these coatings.

Better hot galvanized coatings seem tied up with better coating structures. Different galvanizing methods result in different coating structures. The studies reported here will help get at ways to improve zinc coatings on ferrous objects.

Photomicrographs of transverse, longitudinal and tapered sections of galvanized specimens were ana-

lyzed. Fig. 1 shows how sections were taken. Of these sections, the 5° tapered views disclose the newest information on structural condition.

Laminar Makeup—The zinc coating is made up of layers. Composition of each layer differs somewhat. The layers correspond in the main to alloy phases in the zinc-iron equilibrium diagram.

Operating conditions of the liquid zinc bath largely decide how thick each layer will be. Change the zinc bath temperature, or dip time, and you change the relationship of the crystalline layers to one another. Other factors also influence this.

Outermost, you find a cast structure—the Eta layer. It has the same composition as the molten zinc bath.

A zinc-iron alloy lies beneath the Eta phase. This layer, called the Zeta phase, has the formula $FeZn_{13}$. It's made up of prism-like crystals classed as monoclinic structures. The Zeta phase is often called the palisade layer. A close look at some of the photomicrographs here will reveal the reason.

Distinct Layers—The next zinc-iron alloy usually seen below the Zeta phase is the Delta layer. Most often it also lies at the iron interface. The bipyramidal hexagonal crystals carry the formula $FeZn_7$.

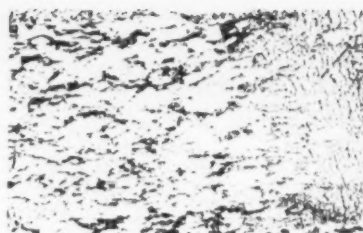
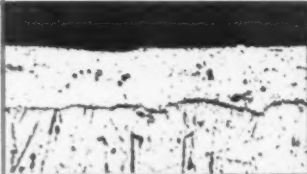
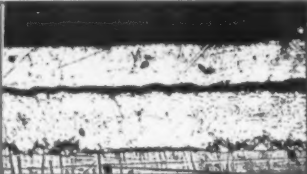


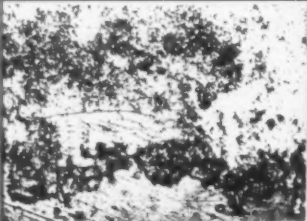
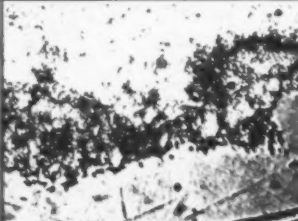


FIG. 6: Tapered view of zinc coating in Fig. 5 shows layer's adherence to steel base. (800x) (8x)

You can predict other alloy crystals from the zinc-iron equilibrium diagram. These do not often appear in photomicrographs because immersion time is too short. Extend dip time enough, and a thin band of Gamma phase alloy (Fe_3Zn_{10}) will appear. If present, you will find it between the Delta layer and the steel itself.

Figs. 2, 3 and 4 show the nature of the zinc coating on commercially-galvanized, charcoal-wiped wire.

No Weakness—Differences between the high and low carbon steel coatings show mainly in the taper sections (Figs. 2 and 4). Note the lined structure of the Delta phase in Fig. 4. This doesn't appear in the Delta phase of the low carbon wire (Fig. 2). These dark lines seem to indicate grain boundaries, and not structural weakness.

TABLE 1	How Iron And Aluminum Affect Galvanized Coatings			Base metal: rimmed steel strip
Transverse sections (800x)				
Iron content, mg/sq ft	29	198	350	
Aluminum content, mg/sq ft	26	20	50	
Tapered sections (800x) (8x)				

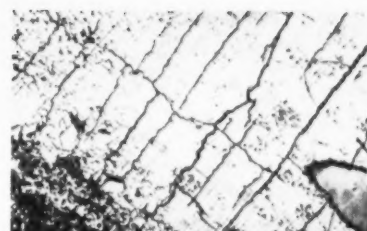
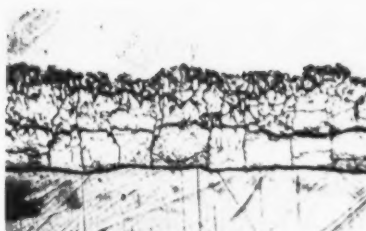
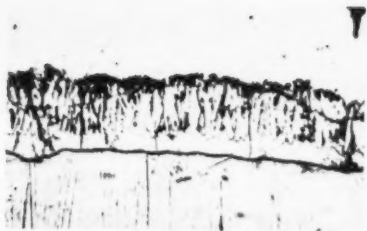


FIG. 7: Compare transverse (l.), longitudinal (center), and tapered (r.) sections of same galvanized wire. Prominent Delta layer forms as wire is softened. Lines

seen in center and right view result from annealing. These lines seem to originate at the ferrous interface. Magnification (l. to r.): (800x), (1200x), (800x) (8x).

Fig. 5 discloses dark lines in drawn galvanized wire. You also can observe flowing of the alloy layers in this longitudinal section. Reduction in area with drawing is the cause.

The taper section of the same drawn wire (Fig. 6) shows laying over of the Zeta crystals. Evidence of the layer's adherence to the steel also appears.

Softer Structure — Galvannealed wire displays a prominent Delta layer in transverse section (Fig. 7, left). Lines in the longitudinal section (center) result here from annealing. The taper section (Fig. 7, right) shows what annealing does to the Delta layer. The equi-axial structure of the Delta layer starts as lines at the ferrous interface in all cases observed in this study.

To compare modern galvanized coatings on strip steel with those resulting from past general practice, see Fig. 8. It pictures the coating structure of sheet steel galvanized in a molten zinc bath with little or no aluminum present.

In Fig. 8, the ferrous base shows at the bottom. Immediately above it lies the thin, irregularly-wide Delta phase. Atop follows the needle-like Zeta layer. Lastly comes the purer zinc, or Eta layer.

Why It Peels—Look at the distribution of both Delta and Zeta layers in Fig. 8. Note there are more Zeta crystals where the Delta layer is thinnest. Photomicrographs of galvanized coatings often show this important relationship. The needle-like Zeta crystals detach

themselves readily when the coating is disturbed. This might lead to production of more dross.

Modern, high-speed, continuous, hot-galvanizing of strip steel is carried out in zinc baths containing 0.10 to 0.20 pct aluminum. This is the so-called high-aluminum bath.

The aluminum inhibits attack of the strip steel by the molten zinc. So less iron dissolves in the liquid zinc. Fewer zinc-iron alloy crystals appear in the cold coating. Consequently, very homogenous films result. In Table I, examine the homogenous nature of the coating containing 29 mg per sq ft of iron.

In some cases, modern zinc coatings seem free of the phase crystals met in galvanizing by older methods. The transverse sections pictured in Table I show few if any of the more brittle zinc-iron alloy crystals. But they are present. To pick them up, you must examine a tapered view of the same coating.

Photomicrographs in the lower portion of Table I are tapered sections. These views disclose phase crystals typical of the zinc-iron alloys, where conventional sections show little if any formation.

Aluminum Varies—These studies conclude that if aluminum-bearing crystals are present, they must be very minute. There seems no consistent relationship analytically between iron content and aluminum content in galvanized coatings. Each manufacturer appears to create galvanized coatings with an aluminum content that reflects his own shop conditions.

Table I lists the aluminum con-

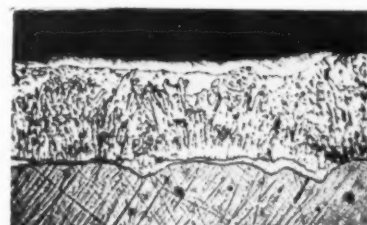


FIG. 8: Galvanized without aluminum inhibitor, this rimmed steel coating contains 1164 mg/sq ft of iron. Seen at 800x.

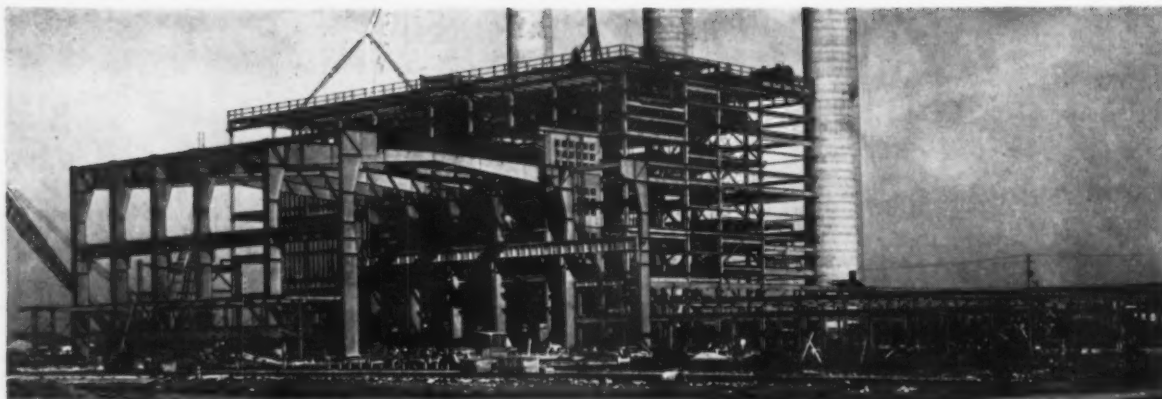
tent of three coatings tested. Values are expressed in milligrams of aluminum or iron per square foot of galvanized strip. More than one producer is represented.

The data in Table I hasn't yet been correlated with coating ductility of adherence. But the coatings of Table I do withstand severe forming.

Hot galvanizers continue their efforts to control the iron dissolved by the fluid zinc. With wire, they do this by limiting dip time. Alternately, aluminum can be added to the bath. Aluminum as an inhibitor finds greatest use in this country on continuous strip galvanizing lines.

Investigation continues in both these areas to improve hot-dipped zinc coatings. Tapered sections of such coatings will supply more precise information than was available earlier.

Photomicrographs taken of these taper views will show more clearly what happens in galvanizing. They can suggest ways of improving ductility in thick zinc films.



PLANT FRAMEWORK: Weld-fabricated columns and girders run up to 60 ft long, 6½ ft wide, 2¼ in. thick.

You Can Weld structurals Without Distortion

By C. W. Lytton—District Engineer, The Lincoln Electric Co., Cleveland, O.

As construction people call for bigger and bigger structural weldments, distortion troubles increase. You've got to solve them.

Such huge weldments absorb much heat, hence distort easily. By controlling weld heat, you cut distortion. Submerged arc welding with two electrodes is one way to do this.



HANDLES BIG BEAMS: Welding carriage (right rear) traverses 90-ft long track automatically, carries boom-mounted submerged arc welding head. Fast-moving welder keeps down girder distortion.

■ If the structural jobs crossing your desk continue to get bigger and bigger, don't be surprised. You can expect this. It's a design trend now strongly entrenched in the heavy construction industry.

Look at one product recently handed to Fort Pitt Bridge Works, Canonsburg, Pa., for a southern power generation station.

The job calls for 80-odd massive, weld-fabricated columns and roof girders. Some are 60-ft long with flanges up to 24-in. wide and 2¼-in. thick. Webs are 1¾-in.

thick steel plate ranging in width from 42 to 81 in. About 240 running feet of 9/16-in. fillet bead are needed on each beam.

Biggest Yet—These structures are believed among the largest solid web-and-flange girders and columns yet fabricated by arc welding.

To handle such work successfully, you've got to control distortion. Fixtures, jigs and positioners will always aid somewhat. But a fixture 60 ft long is apt to be more hindrance than help.

It makes more sense to start at the source of distortion: To do something about weld heat. Such enormous weldments will absorb fantastic amounts of heat, if available. Distortion naturally results.

Submerged arc welding with twin electrodes is one way of holding down weld heat distortion.

Two consumable electrodes are used here. They feed automatically through a single jaw into the arc. Current flows between these electrodes and the grounded workpiece.

Weld Faster—Twinarc welding holds most if not all the advantages of the standard submerged arc process, plus a few of its own. Two electrodes feeding into the arc, instead of one, mean faster metal deposition. This means you can choose one or perhaps more of the following: (1) faster welding rate, (2) thicker fillets, and (3) welding in a single pass.

Heat input with submerged arc welding may be greater than with other common welding methods. But it takes less time to heat the joint to welding temperature. This because considerably higher amperages are commonly used.

That means heat doesn't travel far from the joint. It's concentrated in a fairly narrow welding zone.

All this leads to (1) a high rate of weld metal deposition, (2) smooth, sound weld beads, (3) deep penetration, and (4) little warpage.

To produce these oversize weldments, chances are you'll need a special production line like that of Fort Pitt Bridge Works.

Line Layout—Essentially, its line comprises (1) an automatic welding head modified for dual arc operation, (2) a self-propelled welding carriage carrying the power supply, (3) a track along which the carriage moves, and (4) two rows of bucks paralleling the carriage track, which hold the work being welded. Lincoln Electric Co., Cleveland, supplied much of the equipment.

The special Cecil C. Peck welder is equipped with a single automatic head adapted for Twinarc operation. It mounts on the end of a boom suspended horizontally from a vertical column. The boom is counterweighted and adjusts up to 6 ft high. It can move to traverse the welding head across the work.

The vertical column sits on a turntable. The boom adjusts horizontally to any angle. A motor-driven pinion engages a rack paralleling the track to do this.

The carriage and its welding head can travel along the track at any normal welding speed. Rate of travel can be altered quickly.

Self-Powered—The carriage mounts three 600-amp dc generators. Their three motors are connected in parallel to a 440-v, 3-phase, ac power supply.

Two 1/8-in. diam mild steel electrode wires are used.

No clamping of the weldment is required. Girder flanges are positioned against the web, then tack welded. Cranes lift the entire assembly onto the bucks. Each buck has a long leg inclined at 45°, and a short rest plate at right angles to the long leg.

In welding position, one flange of the workpiece is supported by the rest plates. The 1 3/4-in. thick web then parallels the long leg.

Agglomerated flux covers each weld joint. It feeds automatically from a head hopper. Flux deposits just ahead of the arc in the valley at the web and flange joint. A vacuum system on the carriage picks up unused flux. Cleaned flux is redelivered as needed to the head hopper. New flux is added to make up for that which fuses and adheres to the welds.

One Pass—The weld forms a natural fillet of 9/16 in. radius. It's laid down in a single pass. Welding speed is 12-14 ipm. Generators are commonly set to deliver 1400-1500 amp at 33 v, dc.

Surface of the resulting weld is almost as smooth as that of the base metal. Weld metal is of uniformly high grade.

After welding the first length of the girder, the carriage traverses to clear it. Cranes pick up and swing the girder around to the bucks on the opposite side of the track.

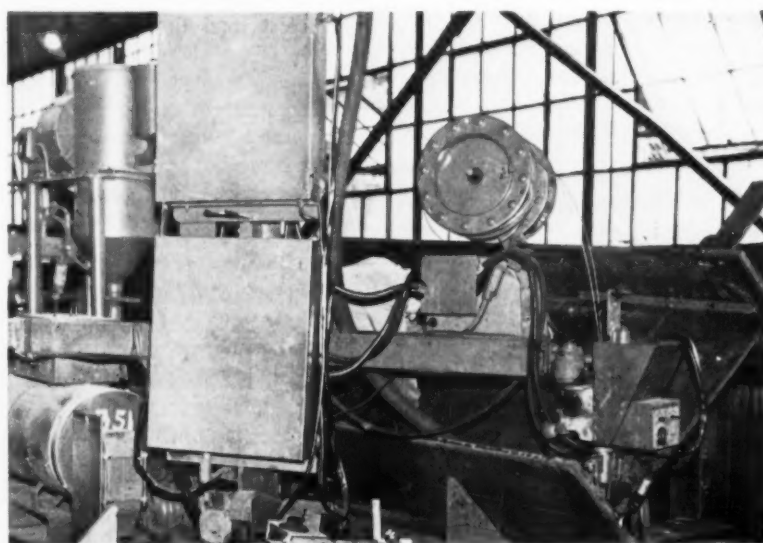
The welding head turns on its boom, and welds a second bead. In doing so, it moves in a direction opposite to that of the first weld. This completes joining of the first flange to the web.

The cranes then rotate the boom so the second flange comes up into welding position. The remaining two joints are welded in the same manner. Stiffeners, if required, are hand welded.

Welding takes place so rapidly that temperature in the girder goes up little. So warpage is not significant. Then too, the weld on one side of the web is followed by another on the opposite side. This tends to counteract whatever slight warpage occurs.

Penetration is deep, despite welding speed. High current density accounts for this.

Rafter girders and columns are for the turbine room of the TVA Colbert steam plant. Construction has already started.



WELD FAST: Bead laid down with twin electrodes at 12-14 ipm forms natural fillet of 9/16 in. Current is 1500 amp at 33v, dc.

Bolts: How Tight is Tight?

By H. Musnitsky—Quality Engineer, George K. Garrett Co., Philadelphia

Tightening nuts and bolts is a simple job. At least so it seems. But how much do you tighten?

There are a number of variables which must be considered. A relatively simple formula takes these into account.

Here's the approach to setting proper torque values.

■ Nuts and bolts are among our commonest fastening devices. Yet it's all but impossible setting standardized torque values to tighten them. A degree of tightness, yes—the requirements of design, materials fastened, the function of the end-product all go into setting rough limits. But a number of other, difficult-to-figure variables also go into the mix.

First step in breaking down the problem of deciding how much to tighten is to understand these variables and the part they play. A simple formula can then help you set up reliable working values for each fastening situation.

Variables fall under four main headings:

Stress Classification—Stress classification depends on the material the bolt is made of. When a nut and bolt of similar materials are tightened to failure, either by the breaking of the bolt or the stripping of the threads, the ultimate load is obtained. This is based on the yield strength of the material, which in turn establishes the stress classification.

Table I shows various types of steel bolts and their stress classifications. These classifications are general in scope. They're expressed

TABLE 1 STRESS CLASSIFICATION OF BOLT MATERIALS

Class	Material	Stress Classification (Min. tensile strength of material, psi)
1.	Commercial Steel Bolts	55,000
2.	Low Carbon Bolts Up to 1/2 in. 1/2 in. to 3/4 in. Over 3/4 in. to 1 1/2 in.	69,000 64,000 55,000
3.	Medium Carbon Steel Bolts, Quenched and Tempered Up to 3/4 in. Over 3/4 in. to 1 in. Over 1 in. to 1 1/2 in.	120,000 115,000 105,000
4.	Medium Carbon Alloy Steel, High Strength Bolts, Quenched and Tempered Up to 1 1/2 in.	150,000

for reference to corresponding torque values in Table II.

Material Joined—The material used in the parts being assembled should, of course, withstand the pound load exerted by the bolt. Your softest material determines the safest load the assembly can absorb. Thus aluminum parts, for example, will set the load to be absorbed, rather than the stress of steel bolts holding them.

This consideration is quite evident when you're applying a gasket or similar "soft" material.

Thread-Surface Friction—Friction set up in the screw threads is one of the major factors affecting the relationship between the torque exerted and the resulting bolt stress. This friction loss on the threads can vary. Use of dissimilar metals or metals differing in hardness, such as a mild steel nut on a case-hardened bolt, will affect the friction loss. So will various types of plating and lubrication on the threads.

These factors must be considered.

Generally, you'll compensate for any effective reduction of friction at the thread surfaces by applying less tightening torque.

This prevents overstressing of the bolt and assembly.

Bearing - Face Friction—The shape and area of surface contact of the nut or bolt can directly affect the torque loss because of friction at this point.

Take a fillister-head machine screw as example. This would present less contact surface than a hexagon-head machine screw, which would in turn present less contact surface than a square nut. Here again, the use of dissimilar metals, different hardnesses, or of plating or lubricants would vary the friction loss.

This major frictional loss at the bearing surface can be limited and controlled by the use of washers.

Great Variety Today—More washers, in more sizes and varieties, are being used today than ever before. Flatwashers provide a bearing

surface to cut friction losses and distribute the applied pressure to a greater area; are useful where you're compensating for a large or oblong clearance hole used for alignment in assembly.

Washers used as locking devices vary from the standard lockwashers and internal tooth washers to special "saw tooth" and belleville washers of special design. Their effects vary. Lockwashers substantially cut the contact surface friction loss, since they're made of metal harder than the bolt and components being joined. Toothtype washers "grip" by absorbing a portion of the applied torque; hence increase friction at the bearing surface.

New type belleville and periphery washers are designed to produce combined effects of standard type washers.

Complex Problem—Other variables exist—class and quality of the threads, tapped hole sizes, torque gun variations, human error in

tightening. All contribute to inconsistencies in torque.

Two factors—design of the units to be fastened and the function of the product—determine the force necessary to "hold" the components. Bolt stress provides this force. It's theoretically possible to tighten a bolt to its yield point, but common practice is to limit the stress of a steel nut and bolt to 60 pct of this yield strength. This should never exceed 80 pct of yield strength maximum.

Where a relatively high bolt tension is required, proper design should provide a bolt of big-enough size, made of material of the required stress classification, and with torque value set to limit the stress to a safe proportion.

Workable Formula—A complete formula for recommended torque, which would compensate for all the variables discussed here, would be quite complicated to derive. It would also be impractical to apply because of the unknown forces in-

involved, largely frictional. All the forces would have to be considered in their proper proportion, dictated by the design and function of the fastened members, for a detailed answer.

But you can approximate a required torque with this equation:

$T = CDF$, where

T = Torque, in inch-pounds

C = Torque coefficient representing the frictional variables (approximately 0.2 for steel nuts and bolts, driven dry)

D = Bolt diameter in inches, and

F = Bolt tension required, in pounds

Table II shows the formula-computed torque values of the stress classifications shown in Table I. Values are theoretical, are to produce 60 pct bolt stress, and are based on the assumption that the fastened members are steel, regular series nuts and bolts with all surfaces unlubricated, with 0.2 coefficient of friction.

TABLE 2

TORQUE VALUES AT 60 PCT OF BOLT STRESS* (UNLUBRICATED STEEL BOLTS)

Bolt Dia.	Thread	Stress Area, sq. in.	Class 1		Class 2		Class 3		Class 4	
			Min. Tensile Strength for Bolt, psi	Torque to Develop Bolt Stress at 60 pct Min. Tensile, Inch Pounds	Min. Tensile Strength for Bolt, Pounds	Torque to Develop Bolt Stress at 60 pct Min. Tensile, Inch Pounds	Min. Tensile Strength for Bolt, Pounds	Torque to Develop Bolt Stress at 60 pct Min. Tensile, Inch Pounds	Min. Tensile Strength for Bolt, Pounds	Torque to Develop Bolt Stress at 60 pct Min. Tensile, Inch Pounds
1/4	20	0.0317	1,750	53	2,200	58	3,800	114	4,750	142
	28	0.0362	2,000	60	2,500	75	4,350	130	5,450	163
5/16	18	0.0522	2,850	107	3,600	134	6,250	234	7,850	293
	24	0.0579	3,200	120	4,000	150	6,950	257	8,700	325
3/8	16	0.0773	4,250	192	5,350	240	9,250	416	11,600	520
	24	0.0876	4,800	215	6,050	273	10,500	472	13,150	590
7/16	14	0.1060	5,850	307	7,300	382	12,700	670	15,900	838
	20	0.1185	6,500	340	8,150	428	14,200	745	17,800	940
1/2	13	0.1416	7,800	468	9,750	585	17,000	1,020	21,250	1,275
	20	0.1597	8,800	528	11,000	660	19,150	1,149	23,950	1,437
9/16	12	0.1816	10,000	678	11,600	788	21,800	1,468	27,250	1,845
	18	0.2026	11,150	758	12,950	876	24,300	1,640	30,400	2,065
5/8	11	0.2256	12,400	930	14,450	1,080	27,050	2,040	33,850	2,540
	18	0.2555	14,050	1,055	16,350	1,230	30,650	2,270	38,300	2,860
3/4	10	0.3340	18,350	1,860	21,300	1,900	40,100	3,680	50,100	4,580
	16	0.3724	20,500	1,845	23,850	2,150	44,700	4,050	55,850	5,050
7/8	9	0.4612	25,350	2,660	25,350	2,660	53,000	5,580	69,200	7,260
	14	0.5088	28,000	2,940	28,000	2,940	58,600	6,150	76,300	8,000
1	8	0.6051	33,300	3,990	33,300	3,960	69,600	8,350	90,750	10,960
	14	0.6791	37,350	4,480	37,350	4,480	78,100	9,380	101,850	12,225

* Based on stress classifications in Table 1.

Continuous Heat Treating Boosts Output, Saves Floor Space

Boost heat-treating output. How? Try building a new wing on your plant. Better still, use one hardening and tempering unit instead of two separate units.

■ Continuous controlled atmosphere furnaces often boost production output for their users. Treating with one unit that hardens and then tempers generally cuts materials handling and manpower costs. It also takes up less floor space.

One small parts producer once used separate units for hardening and tempering. Now they've switched to a single setup for this. A gas-fired, controlled atmosphere, shaker hearth furnace effects time and dollar savings up to 30 pct over the old system, the user reports. This includes labor and handling.

Use Tailor-Made Unit—The firm, Bristol Co., of Waterbury, Conn., uses a cycle of harden, quench, temper and quench in heat-treating hex socket set and cap screws. They do this in a continuous process furnace, "tailor-made" by Westinghouse.

The recently installed setup gives the company 400 lb per hour capacity. This is 150 lb more than they had been getting.

In this instance, the company also has a space problem. Thus, the unit's compactness is welcome. The firm frankly admits that if it had to produce a similar amount of work with previous equipment, they

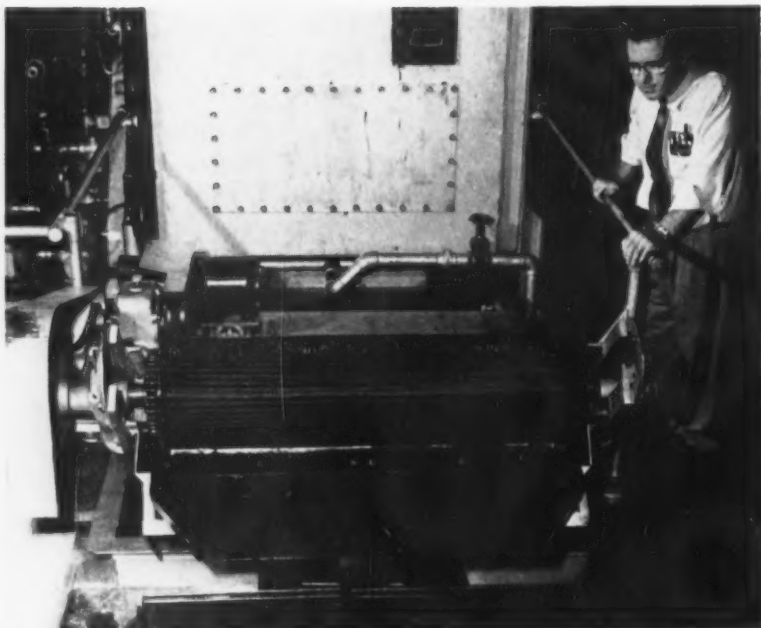
would have had a hard time finding room in the plant area for it.

Works Six Days—At Bristol Co., the furnace operates six days a week. It processes about 25,000 lb of small screws at temperatures to 1700°F in that length of time. Temperatures must vary. This is due to the treatment of parts made of different alloys. The usual temperature for hardening at this plant is 1550°F.

The furnace uses an endogas atmosphere; this prevents oxidation and decarburization of the surface of the work being treated.



SIZES VARY: These are typical of various size items continuously handled by the furnace.



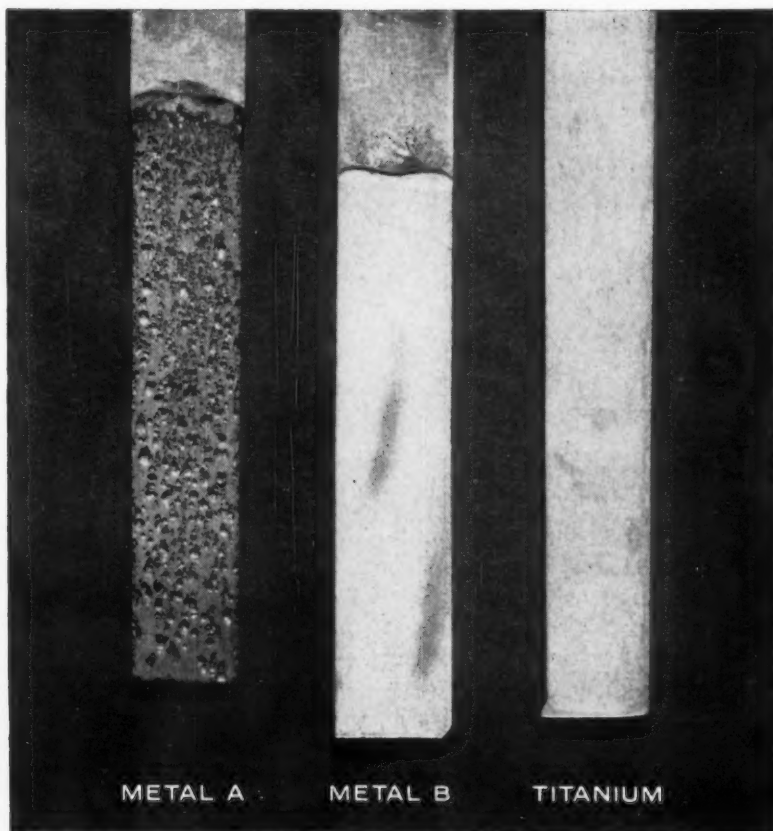
PAYOFF END: Emerging from furnace, parts fall from belt into boxes.

As for handling, the parts move continuously through the unit either by shaker action of the hearth or by a conveyor belt.

Though the floor-space saving is considered very important by the company, plant metallurgist J. M. Quinn believes that the biggest feature of the new furnace is its increased production. He points out that the heat-treating output is up three times over past performance. This results without any increase in the labor force.

The heat-treating operation requires only the part-time attendance of two men.

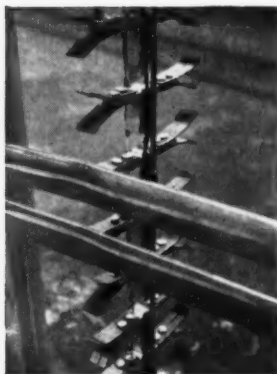
Progress
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Test strips of three different metals after partial immersion for 24 hours in the same solution containing 10% nitric acid and 20% ferric chloride. Only titanium was unaffected. Both other metals are commonly used in certain processing applications.

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Clamps on racks used to hold automotive moldings in anodizing bath. Titanium clamps last up to 30 times longer than other metals tried in electrolytic solution.

● In a surprising number of applications titanium is just that. For titanium has exceptional resistance to many corrosive media that quickly destroy other metals.

For example, titanium is uniquely superior in resisting corrosion by such common industrial chemicals as nitric acid, solutions of chlorine, chlorinated compounds. Also, titanium is not susceptible to stress corrosion. It resists pitting attack in a solution where corrosion does take place. Thus this new metal is being used in more and more places, where corrosion wastes money—in process vessels, piping, filters, heat exchangers, and many other types of equipment.

Titanium has a big future. Let us help you "design ahead" with this exceptional metal. We'll be glad to supply corrosion data, and help you evaluate titanium in your applications. Write Dept. R-4, for complete information.

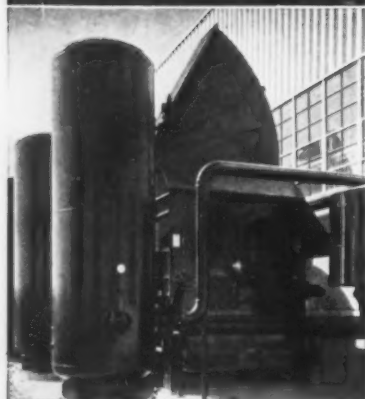
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TECHNICAL BRIEFS

Mill Uses New Setup To Weld Big Pipe

Canada's newest pipe mill turns out sizes to 36-in. OD. Like most new plants, it utilizes the latest in testing, inspection and handling.

It is significant that the mill uses a relatively new cold-expanded electric fusion weld process in its production steps.

■ When a new mill in Canada started turning out 20 to 36-in. diam pipe recently they introduced a new pipe-making process into the country. This is the cold-expanded electric fusion technique.

Using the method, Welland Tubes, Ltd., Welland, Ont., can produce 200,000 to 300,000 net tons of large-size pipe annually.

Gets Grease Out—At the beginning of the process, flat pieces of steel skelp are stacked on edge in big pickling racks. These 40-ft lengths are immersed in a bath of sulphuric acid, water and soda. This removes all traces of grease, mill scale, rust and dirt.

From the pickling rack, the steel skelp moves to an edge performing machine. This shears the edges to exact width, bevels them and pre-forms the skelp by an initial bending at the edges. Then a large press forms the skelp into a U-shape.

Uses Rifle Sight—After forming flat steel skelp into open-seam pipe, they fusion-weld the pipe both inside and outside. To ensure accuracy on the welding of the outside seam, an operator uses a rifle sight to maintain the position of the welder over the seam.

Then, in a massive hydraulic

expander machine, the extreme ends of the pipe are expanded mechanically and the body of the pipe hydraulically. This expansion process effects a cold working of the metal which increases the pipe strength.

Throughout the process the company maintains tight quality controls. The finished pipe is given



The 800-ton press in the rear shapes these 20-in. pipes.

rigid tests for accurate diameter, wall thickness and weld strength, both inside and out.

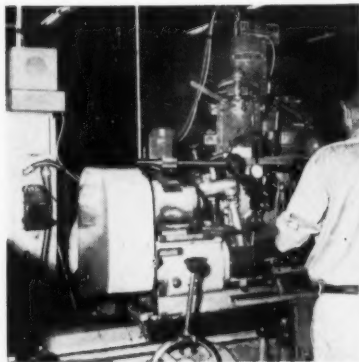
Inspector Rides Buggy—In all sizes of pipe 20 through 36-in., an inspector rides through the pipe on a special buggy to examine the inside surface and weld.

Want More Data?

You may secure additional information on any item briefed in this section by using the reply card on page 141. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

Wheel Dresser Hears Grinder On Hi-Fi

When it comes to grinding wheel dressing, the grinder operators at Johnson Motors in Waukegan, Ill., "play by ear." Like many experienced grinders, they listen to the dressing tool during its pass across



Speaker (left) and pickup unit aid audible truing of wheels.

the wheel. The sound tells them when the wheel has "sparked out," indicating a properly dressed wheel.

However, the operators now have added hi-fi equipment to the job. The electronic setup amplifies the dressing sound above other sounds in the area. According to Johnson, the setup eliminates guesswork considerably.

Grinds Gears—This equipment is mounted on two Norton 6-in. angular wheel head grinders. These grinders plunge-grind the thrust face and bearing diameter on spiral gears. The wheels are dressed with a 60° angle on the side and 30° on the face. An automatic wheel guard truing device does the dressing.

The hi-fi equipment consists of two sensitive crystal pick up units. One of these mounts on the dresser slide of each machine. It also uses a 5-w hi-fi amplifier and a speaker. The amplifier and speaker are mounted in a cabinet to the rear and between the machines.

Borrowed the Idea—Two Johnson men originally saw this idea in use at the George Gorton Machine Co. in Racine, Wis. They brought

new . . . booming . . . stainless steels call for alloy help



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New, high-manganese stainless steels are catching on fast. Their lower costs and better mechanical properties are just one reason. Producers and fabricators of the old high-nickel 300 Series alloys, now able to minimize the effects of nickel shortages, are switching to the new 200 Series. Others who have long looked with interest at stainless, but were discouraged by possible shortages, are adding to the growth.

If you are a steel producer, when you pursue the new stainless steels you'll need more manganese. You'll call for the purest manganese made . . . electrolytic manganese . . . because it's the cheapest way to get the necessary manganese content without harmful impurities.

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TECHNICAL BRIEFS

back the details and installed the system in their own plant.

According to the firm, the use of sound amplification in industry offers many possibilities in fields other than wheel dressing. For example, such equipment could be used to actually hear a part seating against a shoulder in an assembly operation or used as an indication of load or volume where sound is a constantly relative factor.

Discuss Environment

The Institute of Environmental Engineers is holding its first annual technical meeting at the LaSalle Hotel in Chicago on April 25 and 26. The Environmental Equipment Institute is also holding a conference on the same dates in the same city at the same place.

The organizations will discuss, among many other subjects: explosion test techniques, hydraulic pump tests at high temperatures, random noise vibration, what to do when it's too big to test, salt spray testing, and acoustically induced equipment failure.

Better Heat Resistant Alloys Seen As Vital

High temperature alloys far better than anything known today must be developed for future needs. If they aren't you can expect some serious setbacks in technical progress. So says R. H. Thielmann, metallurgy department head of Stanford Research Institute.

Speaking at an American Institute of Mining, Metallurgical and Petroleum Engineers at New Orleans, the metallurgist stated that development of a tungsten base alloy promises to be one answer.

Situation Critical — "Currently, the situation with regard to materials is particularly critical," he says. He points out that technology in many fields is moving constantly in the direction of higher and higher temperatures. Requirements for ma-

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materials which have very good properties over the wide temperature range of 1000 to 2500° F are critical in hot working tools such as rolls and dies, in the power field, including gas turbine engines, and in the nuclear power field.

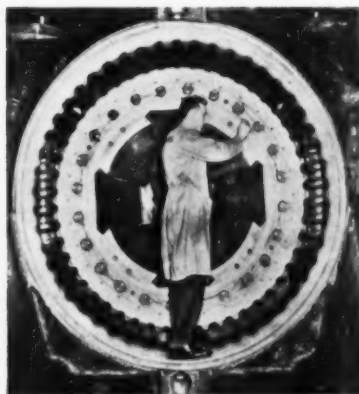
The metallurgist emphasizes that several of the super alloy materials now in extensive use are marginal risks and metallurgically unstable at temperatures greater than 1650° F. He says that of 18 metals which have higher melting points than those of iron, nickel, and cobalt, there are only four which have significantly higher melting points that are available in sufficient quantities to be considered for many applications. These are: columbium, molybdenum, tantalum and tungsten. All of these should prove to be important in developing alloys for service at temperatures above 2000° F.

Tungsten, with its high melting point, high modulus of elasticity and high recrystallization temperature, appears to be especially promising for the extreme high temperature requirements, he feels.

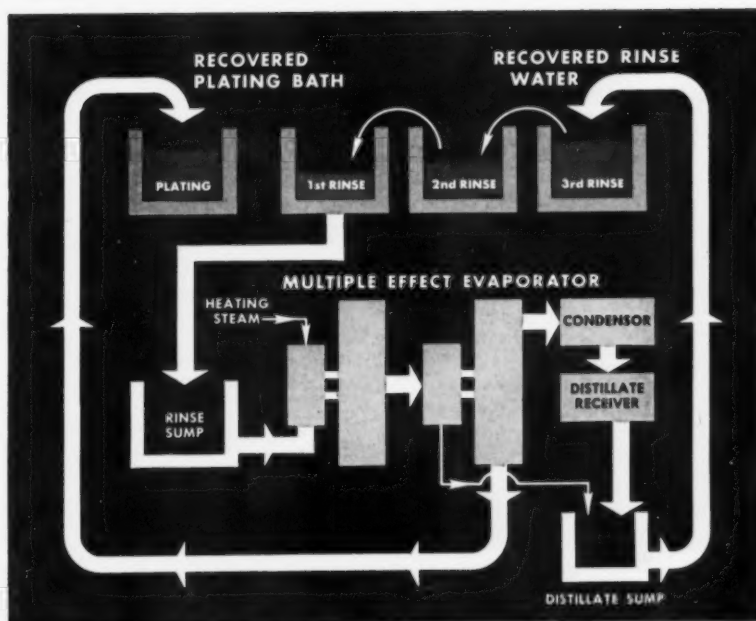
Firm Meshes Powerful Gearset For Press

With a running torque rating of 200,000 in.-lb, a powerful gearset is currently being readied for the Air Force's press program. It is the most powerful ever designed by its maker.

With a guaranteed static torque rating of 30,000,000 in.-lb, the gearset is now under production by



This gearset has a torque rating of 30-million inch-pounds.



New recovery system cuts plating costs!

Industrial's Plating Bath Recovery Equipment provides complete recovery of acid and metal dragout losses, using a rapid evaporation process engineered to suit your operation. The savings can be fantastic... the system not only returns fresh plating solution to the bath and pure water to rinse tanks... it eliminates the high cost and trouble of neutralizing corrosive rinse water for disposal.

Here is a typical example of what Industrial engineers can do:

Saves \$925.00 per week. A company plates metal parts with a copper-tin-lead alloy, using a series of plating machines with a total bath drag-out of 16.65 gallons per hour. Replacement of solutions and destruction of rinse water (to avoid damage to sewage systems and to meet anti-pollution requirements) costs \$12.46 per hour. **Recovery with an Industrial unit costs \$2.13 per hour.** The equipment pays for itself in 164 working days.

Unbelievable? ... No sir! ... these are systems designed by a company with a 30-year reputation for building the best in plating equipment. Let us prove it—our staff will be glad to make an analysis of your process, recommend equipment and estimate costs and savings.

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Because they are produced by *turning*, rather than by less accurate methods, Fischer brass and aluminum nuts set new standards of precision and quality that speed assembly operations . . . reduce costs. Uniformly accurate, Fischer nuts are tapped square with the face to Class 2 tolerances . . . countersunk on both sides . . . burrless . . . cleaned and degreased before delivery.

You pay no premium for Fischer *precision-turned* nuts . . . they're priced no higher than those made by less exact methods.

Prompt delivery of all standard types and sizes is assured by large factory stocks . . . "specials" can be produced quickly and economically.

HERE...take a look at precision



Investigate the savings possible with Fischer turned nuts. Write today for Catalog No. 55.



Fischer
SPECIAL MFG. CO.

445 Morgan Street
Cincinnati 6, Ohio



TECHNICAL BRIEFS

Cone-Drive Gears Div., Michigan Tool Co., Detroit. Center distance of the double-enveloping unit, which has two worms driving the gear, is only 44 in. Comparable torque ratings with conventional cylindrical worm gearing would require a 55- to 60-in. center distance gearset.

Less Housing Space—The unit's unique design wraps the worm and gear around each other. This reduces housing space and weight while increasing power capacity.

The setup is part of a 1500-ton stretcher built by the Lombard Corp., Youngstown, Ohio. It is a companion piece to an Air Force Lombard 12,000-ton extrusion press.

Brazing Alloy Eases Aluminum Joining

Self-fluxing, a relatively new brazing alloy, joins many types of aluminum alloys. The alloy comes in dry powder form and applies as an aqueous slurry. It is meant for use in a molten salt bath. The material joins the following aluminum alloys: 2S, 3S, 52S, 54S, 61S, 62S, 63S, 66S and several types of casting alloys.

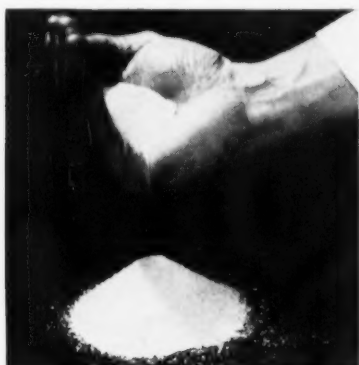
Known as Alumibraze, the alloy makes possible certain joining techniques not heretofore too practical. The material "paints" on; thus it applies conveniently to any surface regardless of its contour. It brazes assemblies where the shape of the parts or location of the joint make it impractical to use preforms or impossible to hand feed solid brazing alloys.

Stays Put—The alloy stays put. It doesn't flow prematurely and wets only those surfaces to which it is applied. It provides a convenient, if not the only way, of repairing many joints. In many cases it is impossible to preplace rings or shims accurately on already-brazed assemblies.

The brazing alloy contains its

own fluxing material. This serves both as a flux and as a cement that keeps the alloy in place during the brazing cycle. The characteristics of the flux are the key to its successful joining. When the slurry dries after application, the flux forms a cement. This doesn't melt at the usual brazing temperatures, but is soluble in the salt.

Alloy Melts—During the brazing process, the alloy becomes molten; it is held in place, though, until the cement dissolves. Dissolution of the cement allows the brazing alloy to fill the joint area by capillary flow.



Originally a powder, the brazing alloy paints on in slurry form.

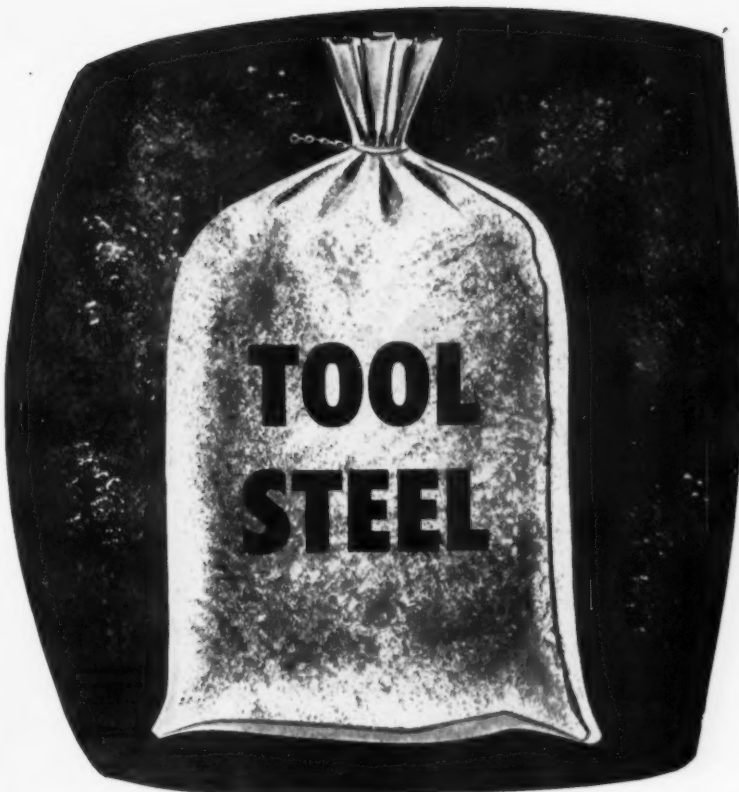
It produces a strong, ductile, and (if enough alloy is used), filleted joint.

The alloy is offered by Handy & Harman of New York City.

Installs Openhearth

Recently tapped for its first heat, a new 275-ton openhearth furnace at Detroit Steel Corp's Portsmouth, Ohio plant has two pass checkers incorporated into its design.

Built by Loftus Engineering Corp. of Pittsburgh, the furnace is equipped with full automatic control. The checker arrangement is unique in that lancing is facilitated for the full depth of the settings in both passes. It was done by extending the charging floor posts to the lower pad level throughout the building. This provides substantial access to both sides of all regenerators.



TOOL STEEL BY THE BAG?

Yes sir, 525 million pieces of round, solid, tough machine tool steel in one 50 pound bag of TRU-STEEL SHOT (S-70 size)!

TRU-STEEL is the original high carbon, fully heat-treated steel shot of tool steel quality!

If your cleaning operation has "machine tool" requirements—if you're doing peening, descaling of sheet or plate, or continuous cleaning of castings or other materials where you need a steel shot that is round, solid, and tough, uniformly from one shipment to the next, you'll want TRU-STEEL.

TRU-STEEL is TRUE STEEL



Write for full information on what TRU-STEEL can do for YOU in YOUR cleaning operation!

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STEEL SHOT PRODUCERS, INC.®

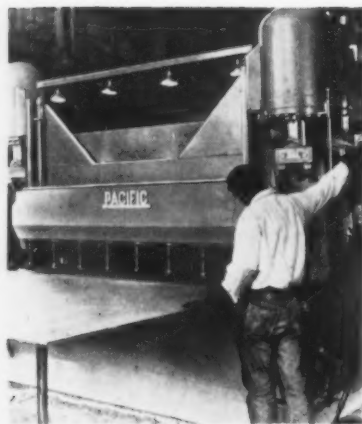
Butler, Pa.

Subsidiary of Pittsburgh Crushed Steel Co.
Pittsburgh 1, Pa.

Sold by Pangborn Corporation, and by leading distributors of foundry supplies from coast to coast

New Production Ideas

Equipment, Methods and Services



Hydraulic Shear Continuously Cuts Steel Plate

This 1/2-in. hydraulic shear constructed on a new design principle cuts full length 3/4-in. plate continuously. Its rake angle is adjustable. By increasing the angle to 3/4-in. per foot, the shear cuts 3/4-in. steel plate with the force normally required to cut 1/2-in. plate. In cutting 1/2-in. plate, its rated capacity, the shear cuts exactly the same as conventional fixed rake angle shears. In cutting 1/4-in. steel, the rake angle is reduced to 3/32-

in. per foot. The shear cuts strips 24-in. long up to 60 per minute with very little twist and a minimum of bow. Twenty gage to 3/4-in. plate may be cut with single knife clearance. For precision work, knife clearance adjusts in 30 seconds to match plate thickness. The shear cuts noiselessly without shock. This results in long life for the unit. (Pacific Industrial Mfg. Co.)

For more data circle No 1 on postcard, p. 141

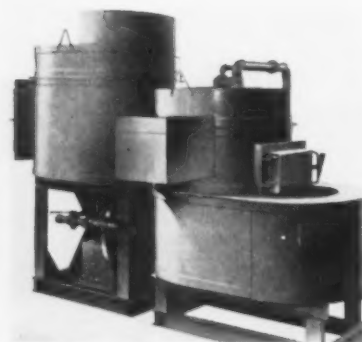


Lift Attachments Allow Palletless Handling

Handling normally - palletized goods without the aid of pallets is now possible. A new multiple attachment does this. The equipment consists of multiple forks, side-shifter and push-off devices. It is especially recommended where complete selectivity of each unit is desired, and when individual unit loads are moved directly from storage to outbound highway trailers or freightcars. In a typical industrial operation, here's how it works: Instead of palletizing goods flowing

off a production line at the end of the line, they are received and stacked on a multiple prong device. To pick up the load, the fork truck operator simply inserts his truck's six forks between the prongs and raises his forks. With the load now on his forks, he travels to the storage area. Here, he deposits the load on special all-steel storage racks. The multiple forks easily slip between the special rack beams. (Lewis Shepard Products, Inc.)

For more data circle No. 2 on postcard, p. 141



Cylinder Furnaces Handle Breakdown, Holding

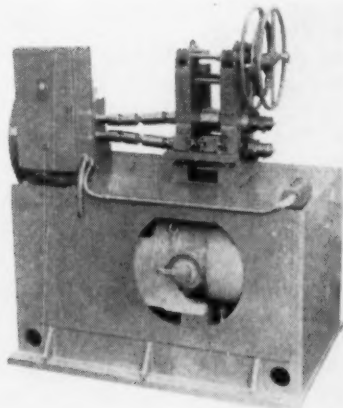
Small and compact, this double-chamber type furnace incorporates two separate units; one is a breakdown furnace, the other a holding furnace. The equipment comes in a wide variety of melt rates and holding capacities. Melt rates range from 450 to 1600 lb per hour. Holding capacities range from 680 to 2450 lb. Contained combustion

burners fire the furnace, providing a mild firing condition. This insures extended refractory life, gas-free metal, and cool working conditions. Should maintenance or relining ever be necessary, furnace downtime can be shortened as much as 50-pct. (Stroman Furnace & Engineering Co.)

For more data circle No. 3 on postcard, p. 141

Mill Rolls Wire

This rolling mill production rolls special wire sections. The two-high, pinion gear drive mill, roll diam 4 in., face width 3 in., uses a vari-speed motor and accessory edger. Compact in size, the model rolls nonferrous wire at speeds up to 750 fpm with a maximum separating force of 40,000 to 60,000 lb. A

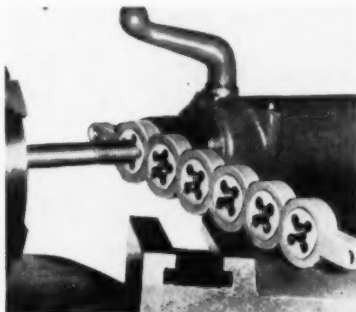


special oversize bed contains the vari-speed motor, oil sump, and coolant tank to minimize floor space requirements. A full line of accessories is available, including grooved or mirror lapped rolls, work entry guides, edgers and take-up reels. (Fenn Mfg. Co.)

For more data circle No. 4 on postcard, p. 141

Tool Cuts 18 Threads

This set of precision made threading die holders cuts 18 threads, $\frac{1}{8}$ to $\frac{1}{2}$ -in. USS and SAE, plus $\frac{1}{8}$ & $\frac{1}{4}$ -in. pipe threads. It saves time



when used on lathes, drill presses or as a hand tool. The dies are always set in holder ready to use. (Mohr Tool & Mfg. Co.)

For more data circle No. 5 on postcard, p. 141



**WORLD'S CHAMPION VEGETARIAN
ATE TREE TOPS...**

When Goose Lake Fire Clay Was 150 Million Years Old

Brontosaurus—
largest creature ever to roam
the earth—wallowed in primeval
swamps like those which covered the Goose
Lake clay deposits 100 million years ago.

Today, the excellent aged qualities of this 250
million year old clay are helping steel plants and
foundries produce finer metals at lower cost. Goose Lake
Fire Clay is processed into many forms of refractories and
insulation products for use in furnaces and ladles.

Fast, dependable service can be made by truck or rail in
a matter of hours. Write to the offices below for
information on your refractory requirements.

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Clay, Fire Clay Brick, Firrox;

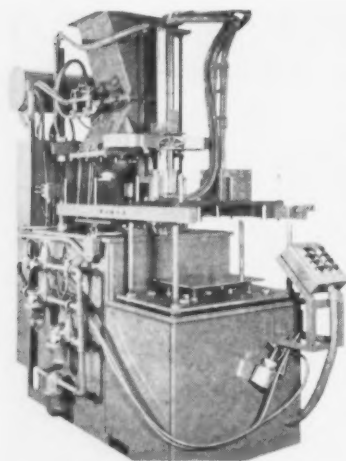
THERM-O-FLAKE INSULATION Coating, Brick,

L. B. Block, Concrete;

CHEM-BRIX Silica, Carbon.

ILLINOIS CLAY PRODUCTS CO.

NEW EQUIPMENT



Machine Produces Shell Cores, Shell Molds

This shell blowing machine produces shell cores or shell molds automatically. By blowing resin-coated sand into electrically heated boxes, it takes the machine only 30 seconds to make shell cores or shell molds ready-for-use. It will make hollow cores, solid cores, contoured shell molds or line cores. Shell cores up to 15 x 20 x 30-in. in height or shell molds up to 16 x 22 x 15 draw are possible. Special features of the machine includes: vertical or horizontal parting fix-

tures for handling hot core boxes or mold boxes, a hydraulic system with cam controls for rotation and positive indexing, a contactor panel with input controllers for maintaining constant and uniform temperature control of core and mold boxes, interlocked electrical operations, and semi or fully automatic operation from a single push button control panel located in the front of the machine. (C & S Products Co., Inc.)

For more data circle No. 6 on postcard, p. 141

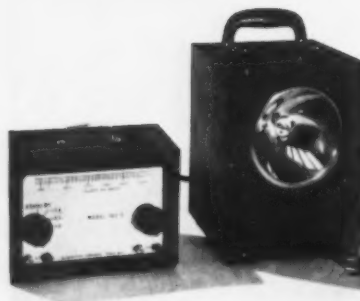


Operator Turns Wrench Once; It Turns Four Times

Using standard sockets and wrenches, this general-utility tool boosts wrench turning force four times. The rugged wrench accessory provides a 4-to-1 mechanical advantage for safe, easy loosening and tightening of heavy threaded parts. The heart of the booster is a set of planetary gears, built into a simple concentric tool head. It completely dismantles in seconds for occasional cleaning or lubrication, and is ruggedly built for tor-

ques up to 2000 ft-lb. At present, there are two models designed for socket-drives of $\frac{3}{4}$ and 1-in. respectively. The compact tool can be conveniently used in the field, shop or plant without need for accessory power. It is recommended for close-quarter work. All standard torque wrenches can be used with the booster. The torque wrench reading is multiplied by four to get the applied torque. (X-4 Corp.)

For more data circle No. 7 on postcard, p. 141



Precision Stroboscope Uses High Intensity Lamp

For speed measurement and motion studies, this stroboscope consists of two units. The control head, compact and weighing 5 lb, can be put where the operator wants it. The lamp assembly, moreover, can be mounted for the best possible illumination from its daylight type high intensity bulb. Moreover, this arrangement allows the use of inter-

changeable control heads for specific applications, or the use of multiple lamps operating synchronously from a single control head. Two standard control heads are optionally available. One is of a wide range continuously variable style. The other is a limited range high precision type. (Slaughter Co.)

For more data circle No. 8 on postcard, p. 141



Heavy Duty Drill Is Powerful and Lightweight

A 1000 rpm heavy duty drill with $\frac{1}{2}$ -in. Jacobs chuck develops 22 ft-lb of torque. Yet it weighs only 9 lb. The model features subassembly construction which makes servicing unusually easy. The gear case removes from the drill without disturbing the motor; the motor also

comes out as a unit without disturbing the gear set-up. To balance the load on the sun gear and oilite bearings, a three-gear planetary system is used. This also permits the sun gear to be threaded for easy replacement. (Air Speed Tool Co.)

For more data circle No. 9 on postcard, p. 141

Hammer Face Is Nylon

Hammers now come with a replaceable molded nylon face. In addition to wearing well, the nylon material lets the soft-face tools resist acids, oils and moisture. Like



rawhide, these new nylon faces will not chip, spark, mushroom nor mar polished or painted finishes, the maker says. They also won't shrink nor loosen in the head or face bore of the hammer, according to the manufacturer. (Chicago Rawhide Mfg. Co.)

For more data circle No. 10 on postcard, p. 141

Shaft Is Flexible

This flexible tool shaft is a lightweight portable production tool for drilling, grinding, sanding, buffing and other finishing operations. The tool shaft consists of a $\frac{3}{8}$ -in. diam music core that rotates inside a rubber covered casing. It comes standard with a ball bearing motor connection and a ball bearing handpiece



with a removable wheel arbor. This shaft connects to any motor by simply attaching its connection to the motor. Because it is lightweight this tool is not fatiguing to operators using it for long periods at a time. It transmits up to $\frac{1}{2}$ hp at speeds up to 6900 rpm. (Stow Mfg. Co.)

For more data circle No. 11 on postcard, p. 141



**TODAY—PREHISTORIC FIRE CLAY
GOES MODERN . . .**

Research Transforms Clay Into Important New Refractories

Illinois Clay research makes possible new refractory and insulating materials that reduce furnace radiation losses, stop lining deterioration, resist slags and erosive action, provide more than twice the life of conventional fire clay ladle bricks, and provide longer life for cupola linings. For example, within the last year, five completely new refractory products were developed . . . they are now cutting costs in many industries.

Illinois Clay Products Co. has excellent production facilities and a convenient location. Fast, dependable service can be made by truck or rail in a matter of hours. Write for information on your refractory requirements.

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THERM-O-FLAKE INSULATION Coating, Brick, L. B. Block, Concrete;

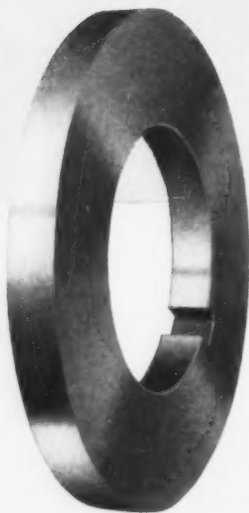
CHEM-BRIX Silica, Carbon.

ILLINOIS CLAY PRODUCTS CO.

COWLES TRIMMING KNIVES

Assure more continuous production and more tonnage from each grind

Cowles knives stay on the job longer. They keep mills in continuous production with minimum downtime for knife changes. Manufactured from individually hammered forgings, and heat treated to assure maximum durability, they meet industry's most exacting requirements. Any diameter, face or bore. Widely used by all principal producers and processors. *Let us quote on your requirements!*



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STANDARD AND SPECIALLY ENGINEERED TOOLS FOR ALL FERROUS AND NON-FERROUS PROCESSING, TRIMMING AND FORMING REQUIREMENTS.



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Sizes and weights to meet all State requirements.
Can be mounted on bases for permanent storage.

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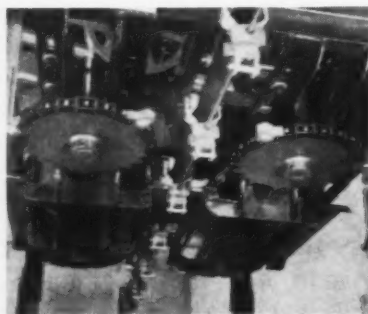


O'FALLON 4, ILLINOIS

NEW EQUIPMENT

Cat Drive On Handler

A caterpillar drive for cable conveyors increases the application of the overhead cable trolley units. Applied on the straight run of conveyors, this drive allows large-radius traction wheel turns to be used. As a result, sizeable loads can be handled on close hook cen-



ters. The drive has two strands of precision chain with special dogs that engage the cable and trolley with equal pressure from both sides. Side thrust is carried by both chains, so that cable movement is transmitted smoothly during engagement. There is no tendency for the trolley to cling to drive dogs on disengagement when using the double caterpillar feature. (The E. W. Buschman Co.)

For more data circle No. 12 on postcard, p. 141

Turns Sheet Edges

Air-powered, a new lock hammer turns any sheet metal locking edge in seconds. The tool does its job in one pass, fast, clean, smooth, and without dents. Easily handling 30 to 24-gage sheet metal, the hammer is portable. (Modern Mfg. Co.)

For more data circle No. 13 on postcard, p. 141

Removes Sand Quickly

Of compact design, a new non-ferrous foundry shakeout removes sand from castings fast. The new machine handles brass, bronze or aluminum molds up to 30-in. square and weights up to 500 lb. It can also be used for small gray iron

and steel molds. It is only 13-in. high and is driven by a one-half horsepower motor with direct drive coupling. The entire shakeout and load ride on soft coil springs. These absorb all vibration and impact. It handles small fragile castings without breakage. Any type of flask can be cleaned within two to four seconds. (Hewitt-Robins, Inc.)

For more data circle No. 14 on postcard, p. 141

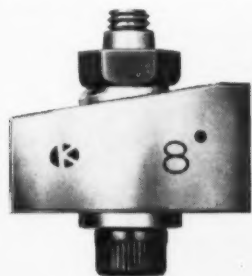
Material Flows Uphill

Weighing seven pounds, a new vibratory feeder requires no rectifier. It operates directly off available alternating current. Highly portable, its rate of feed is completely adjustable from a maximum 500-lb per hour to as little as a tiny trickle or a single pill or pellet at a time. The unit combines an electromagnet with an Alnico V permanent magnet to produce dependable, precisely controllable vibratory impulses. These cause material in its tray to move forward, in a flowing motion, at a desired rate. It even will move materials upward at inclines to 10°. (Eriez Mfg. Co.).

For more data circle No. 15 on postcard, p. 141

Hex Nut Aligns Itself

Providing for misalignment of up to 8° in any direction between bolt holes and mounting surfaces, a new self-aligning and self-locking hex



nut eliminates spotfacing or use of tapered shims. It is useful in many applications, including tapered spar caps, tapered skins, forgings and castings with draft angles. Designed

NEW FROM ILLINOIS CLAY RESEARCH . . .



**Lasts 50% to 75% Longer Than Conventional
Fire Clay Ladle Brick**

Chem-Brix is the ideal ladle brick for Bessemer steel ladles and iron ladles. It provides 100% size uniformity with 5% expansion to 2350°F. for tightest joints, simpler skulling. The monolithic, smooth, self-cleaning surface sheds molten metal like oil repels water. And since metal does not "wet" or penetrate the surface, Chem-Brix wears up to 75% longer than conventional fire clay ladle brick. Write today for our new folder which explains Chem-Brix in detail.

Remember—Illinois Clay Products are produced at Goose Lake, only 55 miles from Chicago. Fast, dependable service can be made by truck or rail in a matter of hours. Contact offices below.

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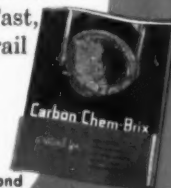
MANUFACTURERS OF:

GOOSE LAKE Ground Fire Clay, Fire Clay Flour, Grundite Bond Clay, Fire Clay Brick, Firrox;

THERM-O-FLAKE INSULATION Coating, Brick,

L. B. Block, Concrete;

CHEM-BRIX Silica, Carbon.



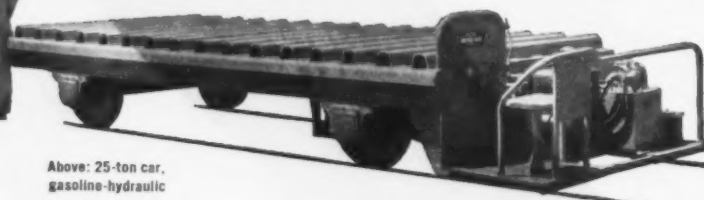
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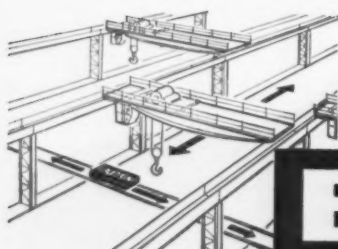
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CUSTOM-BUILT in capacities from 5 to 500 tons. Supplements overhead crane work in multiple-bay plants. Also for low-cost, heavy-duty service between buildings, storage and shipping areas.

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NEW EQUIPMENT

with a spherical seat and matching lightweight washer the fastener works in temperatures up to 550°F. (Kaylock Div., Kaynar Co.)

For more data circle No. 16 on postcard, p. 141

Duo Sandblasts Parts

Sandblast cabinets just introduced may be used either with an adjustable mounted blast unit or with a trigger-controlled hand blast gun. This permits fast production runs that lend themselves to sandblasting by mounted blast units. (Cyclone Sandblast Equipment).

For more data circle No. 17 on postcard, p. 141

Mesh Won't Corrode

Corrosion resistant titanium wire cloth is now available. It has good elongation and uniformity of temper. The material is presently being mass produced in 30 x 30 mesh,



made of 0.016-in. wire and 10 x 10 mesh with wire 0.035-in. in diameter. Other mesh sizes come in stainless steels. (Cambridge Wire Cloth Co.)

For more data circle No. 18 on postcard, p. 141

Cloth Buffs Softly

Versatility of buffing on stainless steel, carbon steel and aluminum is provided by the use of a centerless unit cloth buff. Made of high quality cloth, the "units" of the new buff are left unsewed for soft polishing action. Unit edges are compactly folded upon themselves, giving a sturdy perimeter and leading edge that hold buffing compound longer. (American Buff Co.)

For more data circle No. 19 on postcard, p. 141

Shaper Performs Toolroom, Light Production Work

This vertical shaper performs general toolroom work and short production runs. It machines regular or irregular internal or external contours in a single setup. The machine tool provides 11½-in. longitudinal and transverse carriage movements. It also has rotary movement through a built-in 12½-in. rotary table. Lateral movements are obtained by handwheel operated accurate lead screws, with worm and worm gear movement of the rotary table. Ram

stroke adjusts up to 5-in. A rocker arm in the ram drive obtains accelerated ram speed on the return stroke. Multiple V-belts drive the vertical shaper. A 2-hp motor powers it. This motor also drives the oil pump which automatically lubricates all moving parts. All controls for selection of ram speeds, stroke length, etc. are within easy operator reach. (Austin Industrial Corp.).

For more data circle No. 20 on postcard, p. 141



Press Feeds Sheets

Sheets automatically feed from a stack through a press with a new setup. The feeder processes blanks one at a time from the loaded stack, through rolling oils, and then through the press. It also feeds the scrap out of the press. A vacuum lift picks up sheets from the stack and deposits these in a transfer carriage. The carriage, in turn, feeds sheets through the press. The feeder adapts to a wide range of sizes and thicknesses. In addition, the feeder is positioned on rails permitting full access to the press for removing dies. Two pumps hydraulically power the unit. A 10-hp, 1800-rpm electric motor drives these. Quick disconnect fittings permit the feeder to move out of the way quickly for rapid die removal. The machine's size is approximately 8 x 14-ft. (Hautau Engineering Co.).

For more data circle No. 21 on postcard, p. 141

Protects Forgings

Two new dispersions of glass in isopropyl alcohol apply to work at room temperature. They form a dry continuous film which inhibits oxidation and surface contamination during heating cycles. At a temperature below that at which the work is forged, the glass fuses to the surface, providing a true hydrodynamic film during the forming operation. The new glass dispersions provide a protective and lubricating coating for the forging of special alloy steels, titanium and other metals. (Acheson Colloids Co.)

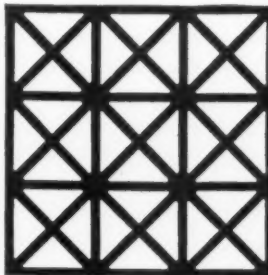
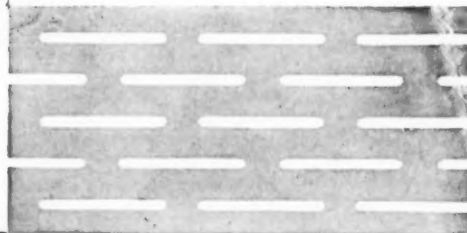
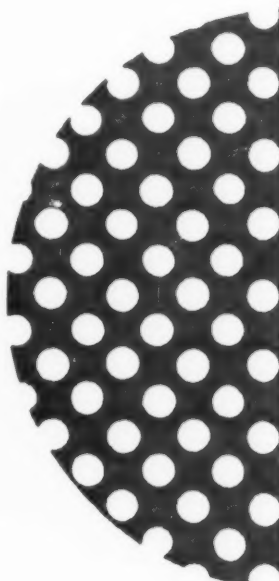
For more data circle No. 22 on postcard, p. 141

count on

WISSCO

**for every type
of perforation**

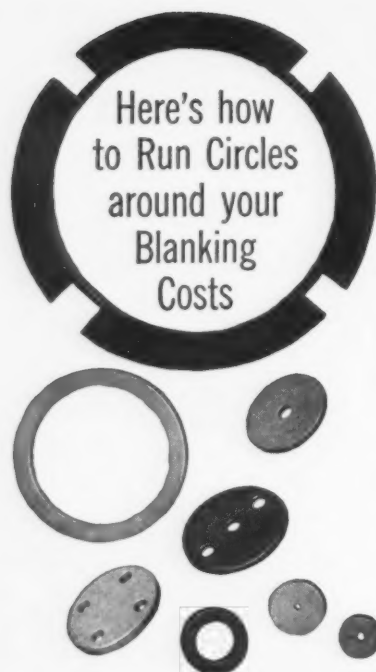
- All metals including stainless and carbon steel, monel, copper, brass, bronze and aluminum.
- Fabricating facilities include rolling, forming, shearing, welding and assembling.
- Material to be perforated can be supplied either by us or by your company.



WICKWIRE SPENCER STEEL DIVISION OF CF&I
Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans
New York • Philadelphia
CF&I OFFICES IN CANADA: Montreal • Toronto

WISSCO
PERFORATED METALS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

1986



From washers to sprockets; from cams to gears—steel plate blanks supply the ideal base for a host of circular parts . . . And for special shapes, too.

Speaking of circles (discs, rings, bosses, sprocket blanks, plates) you can figure we save you time, and die and machinery costs, with our stock dies—almost every fractional diameter up to 26½ inches!

And for parts that must be "out of round"—special shapes to your design—you can bank on faithfulness to drawings, close tolerances and absolute flatness.

Press capacity for steel plate 3/16" to 1¼" thick. Machining and heat treating operations available. Large inventory in mild and high carbon steel. Custom service at prices you'll applaud. Let's get together. Write, phone or wire!



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Pressed Products
Corporation**

6716 Union Ave., Cleveland 5, Ohio
VULCAN 3-7900

FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 141.

Non-corrode Steels

Two super corrosion-resistant stainless steels are now available in full finished long lengths of tubing and pipe. Their application, corrosion resistance properties and workability are detailed in a new bulletin. (Carpenter Steel Co.).

For free copy circle No. 23 on postcard, p. 141

Casting Finish

How to get a finer casting finish is the subject of a 4-page folder. It tells how to save on cleaning costs and how to pour castings to a more exact size. This is done, it states, with a new core and mold treatment material. (United Oil Mfg. Co.).

For free copy circle No. 24 on postcard, p. 141

Fork Lifts

Electric fork trucks are described in a new catalog. The 20-page publication offers complete details on a line of rider type units in capacities from 1000 to 4000-lb. (Lewis Shepard Products, Inc.).

For free copy circle No. 25 on postcard, p. 141

Gas Furnaces

Oven furnaces are shown in a new booklet. These units, it states, are engineered to withstand severe and continuous service in commercial heat-treating plants. The dozen-page publication lists opera-

tional advantages, construction features, standard operating temperatures, etc. Several models are pictured. (American Gas Furnace Co.).

For free copy circle No. 26 on postcard, p. 141

Sander

Specifications of a lightweight air sander appear in a bulletin. It describes an orbital sander that weighs just 3-lb. Yet, it has a high work capacity. (Sundstrand Machine Tool Co.).

For free copy circle No. 27 on postcard, p. 141

Automatic Welding

Simplified automatic and semi-automatic welding are detailed in a brochure. It covers a new controlled arc power supply. This rectifier-type welder supplies current at preset constant voltages to assure a highly uniform bead shape. (Metal & Thermit Corp.).

For free copy circle No. 28 on postcard, p. 141

Motors

Motors for single-phase application are shown in an 8-page catalog. It illustrates specific design advantages of these capacitor type motors, 1/3 hp, 115/230 volts, 60 cycles. (General Electric Co.).

For free copy circle No. 29 on postcard, p. 141

Presses

Horizontal, multi-station, automatic redraw presses are described in a 12-page publication. These presses are for quantity production of straight and shouldered, deep shells in a wide variety of sizes and shapes. Detailed information covers 13 machines with 5 to 12 stations having blank length maximums

ranging up to 9-in.; production rates to 100 shells per minute. (Waterbury Farrel Foundry & Machine Co.).

For free copy circle No. 30 on postcard, p. 141

Air Conditioners

Eight new air conditioners have been added to one company's line. Descriptions of the new units, which range in capacity from 1370 to 21,000 cfm of air, are contained in a new catalog. (Acme Industries, Inc.).

For free copy circle No. 31 on postcard, p. 141

Dual Spindle Lathe

A folder details features of a new dual spindle lathe. Designed to provide facilities for turning both large diameter and small diameter work, the machine-tool is virtually two units in one. (The Boye & Emmes Machine Tool Co.).

For free copy circle No. 32 on postcard, p. 141

Band Saw Blades

Metal band saw blades are listed in a folder. It is a handy guide for users in solving their saw problems in ferrous and non-ferrous metals. A complete list of the latest machine specifications is given to help the user select the proper blade for his machine. (Henry Disston Div., H. K. Porter Co., Inc.).

For free copy circle No. 33 on postcard, p. 141

Fire Protection

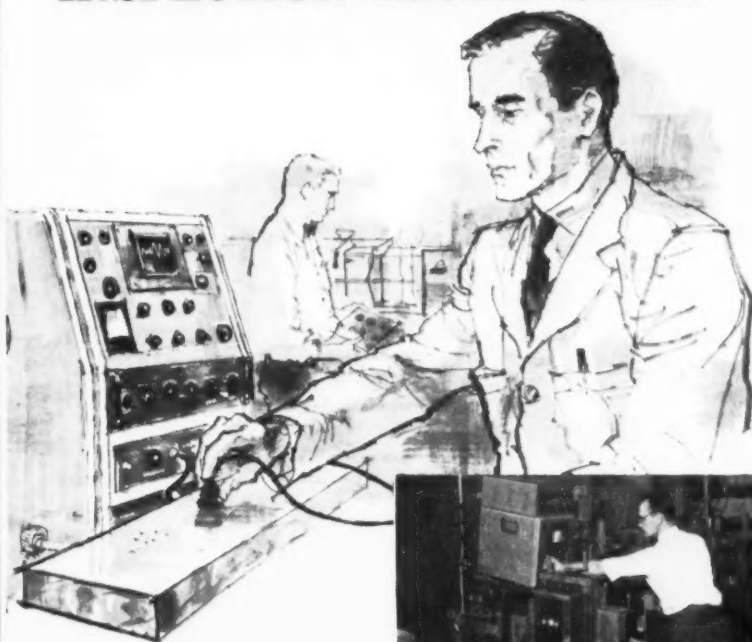
Planning of fire protection for structures and equipment associated with power generation and transmission is aided by a new 12-page bulletin. It discusses fire protection needs. A special feature is a foldout chart covering water spray, mechanical foam, CO₂ and dry chemical systems. ("Automatic" Sprinkler Corp. of America).

For free copy circle No. 34 on postcard, p. 141

Lathes

A trio of folder-type bulletins give complete coverage to a line of "Dial-Master" lathes. They picture and explain use of: a heavy duty model (formerly 20-in.), precision

IS YOUR PLANT USING THE MOST MODERN INSPECTION TECHNIQUES?



Sperry Ultrasonic Reflectoscopes are found in the modern metallurgical laboratories of leaders in the metals industry. The Ultrasonic UW Reflectoscope is a new research tool that has proved its reliability and usefulness in the search for closer quality control... for new and better materials. Ultrasonic waves probe deep inside steel... nonferrous metals... ceramics... plastics—revealing even the smallest flaws and hidden internal defects. The Reflectoscope not only locates these flaws—it also determines their approximate size! In addition, it can even be used to determine elastic properties.

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Automatic Ultrasonic Inspection of continuously produced steel strip and welded tube is one of the most recent Reflectoscope inspection techniques brought from laboratory to production line.



Regular Maintenance Inspection of production equipment, like this extrusion press, is a valuable extra duty which many owners assign to their Reflectoscope when the instrument is not required for lab and production tests.

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ULBRICH Stainless Steels

**Immediate Delivery
from Stock**

STRIP • Flat Wire and other Stainless Steels

a foot or a pound
and up
to your EXACT requirements
from the BIGGEST little Con-
verting Mill in the country.

**Complete
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Wallingford, Conn.
Established 1924



FREE LITERATURE

tool room units (formerly 16 and 20-in. models), and another heavy duty (formerly 16-in.) machine-tool. They all feature dial-type headstock controls. (The Sidney Machine Tool Co.).

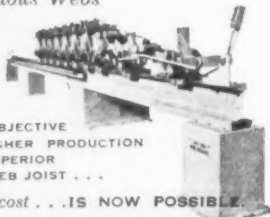
For free copy circle No. 35 on postcard, p. 141

Work Positioners

Advantages of a particular self-leveling work positioner in solving many different material positioning

Mr. Fabricator! WRITE FOR FREE BROCHURE.

"Continuous Webs"



YOUR OBJECTIVE
FOR HIGHER PRODUCTION
OF A SUPERIOR
OPEN WEB JOIST . . .

at less cost . . . IS NOW POSSIBLE

EIDAL MFG. CO. P. O. Box 1299
Albuquerque, New Mexico

and handling problems are demonstrated in a new folder. (Lowerator Div., American Machine & Foundry Co.).

For free copy circle No. 36 on postcard, p. 141

Fork Truck

Operating and maintenance features, specifications and dimensions of a 4000-lb capacity fork truck are contained in a 6-page brochure. Drawings illustrate such innovations as swing back hood, self-adjusting brake, adjustable upright assembly, quickly removable counterweight and other features. (Clark Equipment Co.).

For free copy circle No. 37 on postcard, p. 141

Potentiometers

Concise information about electronic Speedomax G potentiometer instruments is contained in a 4-page data sheet. The units indicate thermocouple temperatures at the flick of a switch on a drum-type scale 25½-in. long. (Leeds & Northrup Co.).

For free copy circle No. 38 on postcard, p. 141

Vacuum Cleaners

High vacuum portable cleaners are presented in a 4-page booklet. The modern, streamlined design of this cleaner, which weighs only 650-lb and is 32-in. wide, permits its handling over uneven floors and through narrow aisles by only one person. (U. S. Hoffman Machinery Corp.).

For free copy circle No. 39 on postcard, p. 141

Woven Wire Slings

Woven wire slings are shown in a new publication. The 18 page catalog gives typical applications. (Cambridge Wire Cloth Co.).

For free copy circle No. 40 on postcard, p. 141

Fans

Containing 8-pages, a bulletin describes many heavy duty industrial fans. (Robinson Ventilating Co.).

For free copy circle No. 41 on postcard, p. 141

It's easier to open or close
a **GOLDEN-ANDERSON**
valve

than to drive a car with
POWER STEERING

Bulletin G-4 tells why G-A valves operate so easily — it's a part of our complete catalog!

Because Golden-Anderson valves use the liquid in the line to operate the valve. Quick positive action is assured regardless of pressure or size of the line. A simple turn of a lever or push of a button is all that's needed.

Get the complete facts on Golden-Anderson valves today!

Write **GOLDEN-ANDERSON VALVE SPECIALTY CO.** 1219 Ridge Ave., Pittsburgh 33, Pa.

FREE LITERATURE

This section starts on Page 124

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

Stub Taps

It's easy to end screw machine tapping problems! That's what a new data sheet says. It introduces a stub tap designed, developed, and manufactured specifically for use in screw machines. (Pratt & Whitney Co.).

For free copy circle No. 42 on postcard

Rubber Gloves

Industrial gloves are covered in a 16-page booklet. The catalog lists and describes gloves of rubber, latex, neoprene, Buna-N, and plastic. Many different types are pictured. (Wilson Rubber Co.).

For free copy circle No. 43 on postcard

Perforated Metals

A 4-page folder describes perforated metals for ornamental and industrial purposes. (Wickwire Spencer Steel Div., Colorado Fuel and Iron Corp.).

For free copy circle No. 45 on postcard

Tubing

How to cut costs, get faster production and improved design with welded steel tubing is told in a 4-page folder. It also describes how to eliminate finishing operations by using certain tubing. (Armco Steel Corp.).

For free copy circle No. 46 on postcard

Liquid Gas

Liquid gas separation is discussed in an 8-page brochure. It covers a liquid-gas separation device for removal of entrained liquids and solids from air, gas and steam systems. (Selas Corp. of America).

For free copy circle No. 47 on postcard

Press Equipment

Press room equipment appears in a 16-page catalog. It features a patented hydraulic system. Modern equipment for handling coil stock, whether it be steel, stainless steel, aluminum, brass, etc., is fully described. (Sesco, Inc.).

For free copy circle No. 48 on postcard

Gloves

Reduction of industrial glove costs is the purpose of two pieces of literature just published. They point out three important buying factors. (1) price, (2) degree of protection they give the workers' hands and (3) wearing qualities, including comfort and flexibility. (Jomac, Inc.).

For free copy circle No. 49 on postcard

Instrument Protection

Stainless steel flasks with unusual heat transfer characteristics are covered in new literature. These special flasks protect instruments against rapid changes of temperature. They can also be used as canteens for hot or cold climates, and as containers for liquid oxygen, nitrogen and argon (Consolidated Electrodynamics Corp.).

For free copy circle No. 50 on postcard

Marking Units

A group of new leaflets cover several production-type marking machines. Units described and illustrated have been designed for high-speed production, and can be adapted for integral line marking, if desired. (Jas. H. Matthews & Co.).

For free copy circle No. 51 on postcard

Pile Drivers

Self-contained, revolving diesel locomotive pile drivers with torque fluid clutch control are shown in a new brochure. It gives general operational capacities and abilities of these pile drivers. Also described is a combination locomotive crane and pile driver. (Orton Crane & Shovel Co.).

For free copy circle No. 52 on postcard

Postcard valid 8 weeks only. After that use 3/28/57 own letterhead fully describing item wanted.

Circle numbers for Free Technical Literature or Information on New Equipment:

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31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70

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(Sec. 349 P.L.R.)
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No postage necessary if mailed in the United States

POSTAGE WILL BE PAID BY

THE IRON AGE

Post Office Box 77
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THE IRON AGE
Post Office Box 77
Village Station
NEW YORK 14, N. Y.

BUSINESS REPLY CARD
No postage necessary if mailed in the United States

FIRST CLASS
PERMIT NO. 36
(Sec. 349 P.L. 85)
New York, N. Y.

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. 3/28/57

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FREE LITERATURE

Highways

"What exactly is the new highway building program that Congress has authorized?" "What will it mean to me?" "Who is going to build the new roads?" These questions are answered—plus many others—in a new booklet. (Caterpillar Tractor Co.)

For free copy circle No. 53 on postcard

Check Valve

A data sheet describes a new MS-approved 1/2-in. aluminum alloy check valve. It also covers a line of MS-type lightweight check valves for 3000 psi service. (Aircraft Products Co.)

For free copy circle No. 54 on postcard

Induction Heating

New and unusual applications used in heat-treating metals appear in a new publication. (Induction Heating Corp.)

For free copy circle No. 55 on postcard

Strapping Tape

Uses and advantages of a new 250-lb tensile strength strapping tape are discussed in an 8-page booklet. (Dutch Brand Div., Johns-Manville).

For free copy circle No. 56 on postcard

Color-coded Gaskets

Instant selection of the correct gage of a gasket, shim, spacer or washer is made possible by the use of a new system. Each gage is made in its own distinctive color. A 4-page folder describes the plastic material and the color-code setup. (General Gasket, Inc.)

For free copy circle No. 57 on postcard

Gravity Feed Oilers

The latest addition to a line of industrial oilers is shown in a new bulletin. It covers a gravity feed model which eliminates dry starts of machinery that has been shut down overnight, on weekends, etc. A spe-

cial reservoir built into the oiler automatically floods the bearing with a fixed amount (about 1/8 oz.) of lubricant the instant the oiler valve is opened. (Trico Fuse Mfg. Co.)

For free copy circle No. 58 on postcard

Temperatures

A temperature conversion chart lists tables of Fahrenheit to Centigrade equivalents. The reverse side of the pocket-size aid shows easy reading qualities of certain thermometers. (Moeller Instrument Co.)

For free copy circle No. 59 on postcard

Heat Exchangers

Recently revised literature covers high temperature heat exchangers. It illustrates and describes units for use in conjunction with: heating, cooling, pickling, plating, flux, caustic, anodizing and/or other acid or alkali chemical solutions. (Nukem Products Co.)

For free copy circle No. 60 on postcard

Wire Partitions

Modern, economical approaches to plant layout problems are pictured in an 8-page bulletin. It deals with various wire partitions and custom enclosures. (Wire & Iron Products, Inc.)

For free copy circle No. 61 on postcard

Infrared Weapons

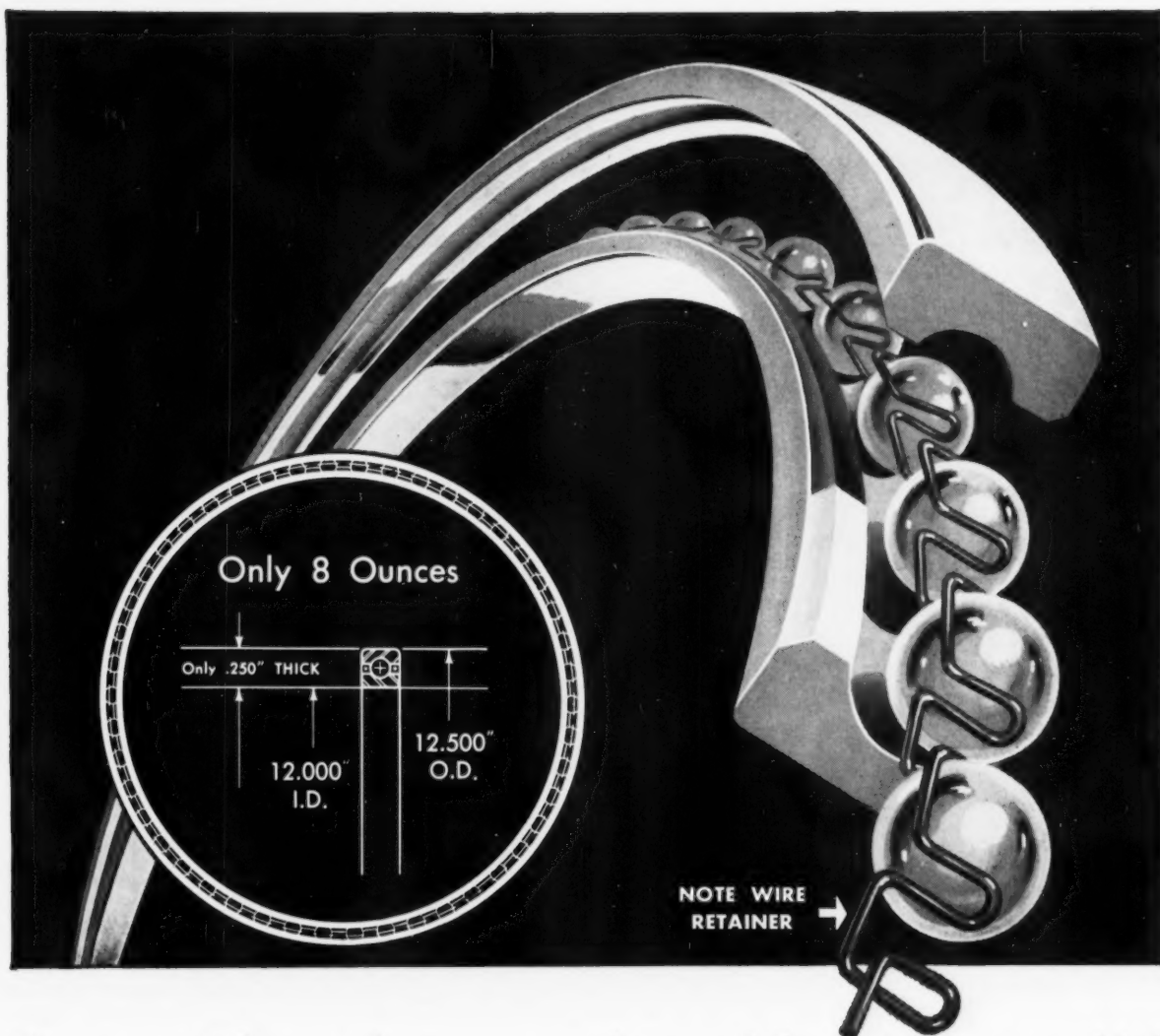
A new 8-page brochure describes infrared applications and research. It discusses the eminence of one firm in the development and production of infrared weapons. (Servo Corp. of America).

For free copy circle No. 62 on postcard

Brass, Bronze Ingots

A new brass and bronze ingot process is described in a brochure. It reviews the advantages of the process. The method, it says, employs radically new methods and apparatus for an additional refining process that goes forward from the point where previous methods have stopped. (I. Schumann & Co.)

For free copy circle No. 63 on postcard



Save weight and space with world's thinnest radial ball bearings—*Reali-Slim* by Kaydon

HERE it is! A *Reali-Slim* radial ball bearing with a wire separator that has just short of a full complement of balls for maximum capacity. What's more, you still get all the advantages of a separator between the balls. This design also gives you a bearing that's light-in-weight and is, without a question, the thinnest bearing ever built in this diameter.

Whatever your product design, there's a small or large diameter *Reali-Slim* bearing that can be the right answer to your thin-section bearing problems.

The radial ball bearing, illustrated here, is *really slim* — 12.000" I.D., 12.500" O.D., .250" thick . . . and weighs only

eight ounces. It has 9,810 lbs. static load capacity, 1,256 lbs. at 100 rpm. Kaydon is able to produce *Reali-Slim*, high-precision bearings because Kaydon specializes in the unusual.

Kaydon bearing engineers are prepared to give you valuable help with technical, thin-section bearing problems.

For detailed information on Kaydon's *Reali-Slim* line, ask for engineering catalog No. 54-RS3 detailing:

***Reali-Slim* Ball Bearings** — Conrad, angular contact and 4-point contact types in seven standard cross sections from $\frac{1}{4}$ " to 1.000" and in bore diameters from 4" to 40".

***Reali-Slim* Roller Bearings** — Radial and taper roller types in cross sections from $\frac{9}{16}$ " and in bore diameters from 5" to 40".



THE KAYDON
MUSKEGON • MICHIGAN

ENGINEERING CORP.

All types of ball and roller bearings — 4" to 120" outside diameter . . .
Taper Roller • Roller Thrust • Roller Radial • Bi-Angular Roller • Needle Roller • Ball Radial • Ball Thrust Bearings.

K-561

LOW COST MARGIN OF SAFETY BETWEEN

DANGEROUS SLIP



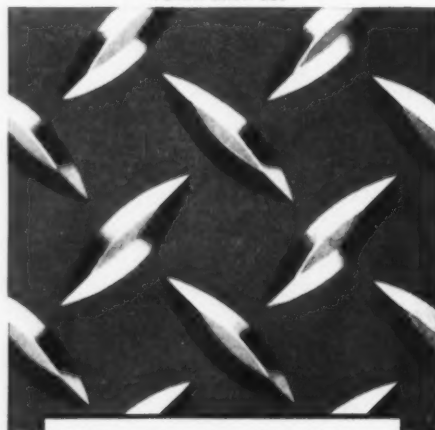
SURE GRIP



- Stops skids and slips *with* Raised steel figures diamond-shaped for maximum slip-skid resistance from all directions
- Get maximum wear *with* Tough rolled steel floor plate
- Easily fabricated *with* Ordinary shop equipment
- No matching problems *with* Non directional pattern—minimum waste
- Cleans, drains rapidly *with* No maintenance problems
- Solve your slipping problem *with* A.W. Super-Diamond as independent flooring, as an overlay—or used structurally.
- For complete information write on company letterhead to Dept. SD-S4.

No other floor plate can match A.W. Super-Diamond's safety and durability at so low a cost.

Pattern actual size



Wherever oil, grease, or other substances raise special slipping accident hazards, we suggest a check on the special non-slip qualities of A.W. ALGRIP—the world's only abrasive rolled steel safety floor plate.



SUPER-DIAMOND

ROLLED STEEL FLOOR PLATE

ALAN WOOD STEEL COMPANY • CONSHOHOCKEN, PA.

Other Products: A.W. ALGRIP Abrasive Rolled Steel Floor Plate—Plates—Hot and Cold Rolled Sheet and Strip—(Alloy and Special Grades)

The Iron Age Summary

Battle of Inventories Continues

Market appears headed for a low point in April. After that, a pickup is looked for.

A lot depends on automotive sales. But car companies still cutting inventories.

■ It all depends on where you sit. Demand continues weak for sheets, strip, wire, and other products. But the market for plates, structurals, and pipe is holding firm. Overall, it adds up to a fairly good steel market.

The May order picture is a little brighter. Whether the market develops further strength depends on how well auto sales come back during the spring selling season.

Inventory Dumping—Some auto companies are unloading sheets through brokers. And part of this odd-lot material is finding its way into the market at below mill prices. The competition has forced some warehouses to meet these prices.

But despite price maneuvering and hard selling in the weaker products, the mills generally are looking for an upturn in May and June. Orders for sheets, manufacturers wire and mechanical tubing have taken a turn for the better.

The Bright Side—The auto companies apparently have not been able to get their steel inventories down to where they want them. The problem is that poor sales are forcing production cuts, which automatically upgrade inventories in terms of days.

Orders for plate, structurals, and pipe are holding steady at high levels. Continued strong outlook in shipbuilding, oil and gas, construction, and freight cars will support these products for months to come. A large producer of pipe has asked its employees to consider foregoing vacations this summer to help maintain production, indicating the strength of this market.

Optimistic Note—Rolling of light plates on sheet and strip mills has offset the drop in sheet and strip orders. This has eased the light plate picture somewhat. But contrary to some reports, plate and structural shapes at the mill level are not easier. On the other hand, some premium tonnages of plate and structurals are not being snapped up as quickly as two months ago.

Another optimistic note: A survey by a large steel company indicates that although steel users are trying to cut their inventories, most of them report their own business is as good or better than it was several months ago. Tight money and the prospect of continued steel labor peace are responsible for part of the inventory cutting.

The oxygen strike is hampering steel output somewhat, but its most serious effect is being felt in the conditioning of semi-finished steel for further processing.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,381	2,392*	5,396	2,425
Ingot Index				
(1947-1949=100)	148.2	148.9	148.0	151.0
Operating Rates				
Chicago	88.0	88.0*	94.0	93.5
Pittsburgh	94.0	95.0	97.0	103.0
Philadelphia	105.0	103.0*	104.0	105.0
Valley	90.0	94.0*	93.0	92.0
West	102.0	101.0	102.0	100.0
Buffalo	95.0	95.0	95.0	105.0
Cleveland	89.0	91.0	97.0	102.0
Detroit	99.0	94.0	106.0	103.0
S. Ohio River	76.0	85.0*	92.0	85.5
South	99.0	99.0	98.0	93.0
Upper Ohio R.	82.0	94.0*	106.0	101.0
St. Louis	99.0	102.0	82.0	97.0
Northeast	66.0	66.0	76.0	90.0
Aggregate	93.0	93.5	96.0	98.5

*Revised—NOTE: Correct "Week Ago" production issue 3-21-57 is 2,407.

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.670	5.670	5.663	5.179
Pig Iron (Gross Ton)	\$64.56	\$64.56	\$62.90	\$59.71
Scrap, No. 1 hvy (Gross ton)	\$45.83	\$48.17	\$53.33	\$52.50

Nonferrous

Aluminum ingot	27.10	27.10	27.10	25.90
Copper electrolytic	32.00	32.00	32.00	46.00
Lead, St. Louis	15.80	15.80	15.80	15.80
Magnesium ingot	36.00	36.00	36.00	33.25
Nickel, electrolytic	74.00	74.00	74.00	64.50
Tin, Straits, N. Y.	102.00	99.50	100.50	99.00
Zinc, E. St. Louis	13.50	13.50	13.50	13.50

*Revised

Sharp Step-Up Made In Sales Effort

Spring's here, but winter doldrums of flat-rolled continue. Wire products, too, are sluggish.

Mills maneuver to get maximum sales results.

■ Pavement pounding is the order of the day for steel mill and warehouse salesmen.

The hard sell is on in earnest as winter buying lethargy for flat-rolled continues into spring. And it's even spreading into other market areas.

Wire products, for example, are not picking up as much as expected. As a result one producer has reasigned some semi-finished tonnage from wire mills into tube mills.

Sales War—This shifting to take maximum advantage of still strong markets is typical of the new look in selling.

Tie-in sales are effective in keeping easy items like butt-weld pipe moving.

Rolling of light plate on sheet-strip facilities continues—one mill is booking through June on this item.

Price Changes—An increase in the base price of some grades of lower alloy, high strength sheet, strip, plate and bars has been announced by Republic Steel Co. Effective March 25, the new prices, in cents per lb, are: 6.275 for sheet and strip, 6.60 for plate, and 6.575 for bars.

Sheet and Strip—The hard sell is on to flush out orders. Some warehouse price slashing is evident, possibly triggered by action of an automaker in dumping tonnage at prices 30-40 pct under mill figures.

However, May ordering is showing improvement over April's in most market areas.

Pittsburgh warehouses are offering specially cut sheets at prices under mill figures for standard size. They are for heavy tonnages and the price warfare takes in a wide area. Move includes galvanized, hot-rolled, and cold-rolled product.

Mill salesmen at **Cleveland** are out looking for May orders. Deferrals of April orders into May have been at about the same level as those from March into April. Sellers feel all buyers are doing is keeping a floating option on product.

Buying is light at **Detroit** with little customer interest in placing May orders. One automaker's inventories are still high. Mills are stocking semi-finished steel to give customers rapid delivery on items where inventory shortness does show up.

Influx of sheet from points further east is hurting the **Chicago** market. Warehouse ordering cut-backs have resulted in cold-rolled sheet being offered for March delivery. Customers seem content to order one month at a time.

PURCHASING AGENT'S CHECKLIST

Wire fabric makers gamble on bigger demand. **P. 71**

Restriction on scrap exporting may last for 3 more weeks. **P. 72**

Analysis of steel company earnings shows 1956 was one of the industry's best years. **P. 78**

"Inventory watching is still on," says a large **Philadelphia** producer. However, May ordering seems better than April's.

Wire Products — Market isn't showing its expected spring-time zip. One large producer is diverting semi-finished tonnage from wire mills to tube mills.

Chicago reports the seasonal upturn in merchant products isn't coming or at least is so gradual it can't be spotted. Deliveries on manufacturers grades are available in as little as three weeks.

Philadelphia describes market slowness as mainly due to lack of industrial buying. Construction and agricultural buying is fairly good.

Merchant wire products are available practically off the shelf at **Cleveland**. Manufacturers wire can be obtained from **Cleveland** and **Boston** plants on 4-6 week delivery. Welded wire fabric is available on 4-6 week delivery at **Cleveland**.

Bars—At **Pittsburgh** bar orders dropped less than 15 pct for April and mills regard this as a hopeful sign. While automotive and implement orders are off and cold finishers lag, construction demand is strong. May rolling schedules seem filled at **Cleveland**. Bar market at **Detroit** is loaded and shifting semi-finished steel to bar instead of sheet mills isn't helping. However, **West Coast** mills are selling all the bar they can make.

Plates and Shapes — Mills at **Pittsburgh** not normally producers of lighter structurals and plates are now turning them out. A light plate producer at **Detroit** is booked through June on that item. Heavy plate and wide flange beams in that area, as elsewhere, are still hard to get. **Cleveland** area mill is shipping out light plate—in cut lengths, not coils—for use in welded pipe.

Pipe and Tubing—There's some slack in plain and seamless at **Pittsburgh** but major oil country products are as tight as ever. Some casing and tube buyers at **Chicago** report a slight easing even in the nickel alloy grades of seamless.

COMPARISON OF PRICES

(Effective March 26, 1957)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Mar. 26 1957	Mar. 19 1957	Feb. 26 1957	Mar. 27 1956
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.675¢	4.675¢	4.675¢	4.325¢
Cold-rolled sheets	5.75	5.75	5.75	5.325
Galvanized sheets (10 ga.)	6.30	6.30	6.30	5.85
Hot-rolled strip	4.675	4.675	4.675	4.325
Cold-rolled strip	6.870	6.870	6.870	6.28
Plate	4.87	4.87	4.87	4.62
Plates, wrought iron	10.40	10.40	10.40	10.40
Stainl's C-R strip (No. 302)	50.00	50.00	50.00	44.50

Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	\$9.95	\$9.95	\$9.95	\$9.05
Tin plates, electro (0.50 lb.)	8.65	8.65	8.65	7.75
Special coated mfg. ternes	9.20	9.20	9.20	7.85

Bars and Shapes: (per pound)				
Merchant bars	5.075¢	5.075¢	5.075¢	4.65¢
Cold finished bars	6.85	6.85	6.85	5.90
Alloy bars	6.125	6.125	6.125	5.65
Structural shapes	5.00	5.00	5.00	4.60
Stainless bars (No. 302)	43.25	43.25	43.25	38.25
Wrought iron bars	11.50	11.50	11.50	11.50

Wire: (per pound)				
Bright wire	7.20¢	7.20¢	7.20¢	6.60¢

Rails: (per 100 lb.)				
Heavy rails	\$5.275	\$5.275	\$5.075-\$5.275	\$4.725
Light rails	6.25	6.25	6.00 - 6.25	5.65

Semi-finished Steel: (per net ton)				
Re-rolling billets	\$74.00	\$74.00	\$74.00	\$68.50
Slabs, re-rolling	74.00	74.00	74.00	68.50
Forging billets	91.50	91.50	91.50	84.50
Alloy blooms, billets, slabs	107.00	107.00	107.00	96.00

Wire Rod and Skelp: (per pound)				
Wire rods	5.80¢	5.80¢	5.80¢	5.025¢
Skelp	4.225	4.225	4.225	4.225

Finished Steel Composite: (per pound)				
Base price	5.670¢	5.670¢	5.663¢	5.179¢

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Averages of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

	Mar. 26 1957	Mar. 19 1957	Feb. 26 1957	Mar. 27 1956
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	\$68.88	\$68.88	\$66.88	\$64.26
Foundry, Valley	65.00	65.00	63.00	60.50
Foundry, Southern Cin'ti	67.17	67.17	67.17	62.93
Foundry, Birmingham	59.00	59.00	59.00	55.00
Foundry, Chicago	65.00	65.00	63.00	59.00
Basic, del'd Philadelphia	68.38	68.38	66.38	63.73
Basic, Valley furnace	64.50	64.50	62.50	60.00
Malleable, Chicago	65.00	65.00	63.00	59.00
Malleable, Valley	65.00	65.00	63.00	60.50
Ferromanganese, cents per lb†	12.75¢	12.75¢	12.75¢	9.50¢
74 to 76 pct Mn base,				

Pig Iron Composite: (per gross ton)				
Pig iron	\$64.56	\$64.56	\$62.90	\$59.71

Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	\$41.50	\$49.50	\$52.50	\$53.50
No. 1 steel, Phila. area	50.50	51.50	55.50	53.00
No. 1 steel, Chicago	42.50	43.50	48.50	51.00
No. 1 bundles, Detroit	40.50	41.50	44.50	46.50
Low phos., Youngstown	45.50	48.50	53.50	59.50
No. 1 mach'y east, Pittsburgh	50.50	54.50	56.50	57.50
No. 1 mach'y east, Philadel'a.	55.50	55.50	57.50	55.50
No. 1 mach'y east, Chicago	47.50	48.50	50.50	55.50

Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	\$45.83	\$48.17	\$52.17	\$52.50

Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	\$15.38	\$15.38	\$15.38	\$14.25
Foundry coke, prompt	\$17.50-\$19	\$17.50-\$19	\$17.50-\$19	\$16.25

Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	32.00	32.00	32.00	46.00
Copper, Lake, Conn.	32.00	32.00	32.00	43.00
Tin, Straits, New York	102.00†	99.50	98.50	99.00
Zinc, East St. Louis	13.50	13.50	13.50	13.50
Lead, St. Louis	15.80	15.80	15.80	16.80
Aluminum, virgin ingot	27.10	27.10	27.10	26.90
Nickel, electrolytic	74.00	74.00	74.00	64.50
Magnesium, ingot	36.00	36.00	36.00	33.25
Antimony, Laredo, Tex.	33.00	33.00	33.00	33.00

† Tentative. ‡ Average. * Revised.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

STAINLESS STEEL

←To identify producers, see Key on P. 158→

Producing Point	Basic	Fdry.	Mall.	Beas.	Low Phos.
Birdsboro, Pa. B6	66.50	67.00	67.50	68.00	.....
Birmingham R3	58.50	59.00*	.....	.....	.....
Birmingham W9	58.50	59.00*	43.00	.....	.....
Birmingham U1	58.50	59.00*	43.00	.....	.....
Buffalo R3	64.50	65.00	65.50	66.00	.....
Buffalo H1	64.50	65.00	65.50	66.00	.....
Buffalo W6	64.50	65.00	65.50	66.00	.....
Chester P2	66.50	67.00	67.50	.....	.....
Chicago I4	64.50	65.00	65.00	65.50	.....
Cleveland A5	64.50	65.00	65.00	65.50	69.50†
Cleveland R3	64.50	65.00	65.00	65.50	.....
Duluth I4	64.50	65.00	65.00	65.50	69.50†
Erie I4	64.50	65.00	65.00	65.50	69.50†
Everett M6	64.50	65.00	65.50	.....	.....
Fontana K1	70.50	71.00	.....	.....	.....
Geneva, Utah C7	62.50	63.00	.....	.....	.....
Granite City G2	66.40	66.90	67.40	.....	.....
Hubbard Y1	.....	65.00	.....	.....	.....
Ironton, Utah C7	64.50	65.00	.....	.....	.....
Midland C11	64.50	.....	.....	.....	.....
Minneapolis C6	66.50	67.00	67.50	68.00	.....
Monesson P6	64.50	.....	.....	.....	.....
Neville Ia. P4	64.50	65.00	65.00	65.50	69.50†
N. Tonawanda T1	.....	65.00	65.50	66.00	.....
Sharpville S3	64.50	65.00	65.00	65.50	.....
So. Chicago R3	64.50	65.00	65.00	.....	.....
Swadland A2	66.50	67.00	67.50	68.00	.....
Toledo I4	64.50	65.00	65.00	65.50	.....
Trar, N. Y. R3	66.50	67.00	67.50	68.00	72.50
Youngstown Y1	.....	65.00	65.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct; 32¢ per ton for 0.5 to 0.75 pct nickel, \$1 for each additional 0.25 pct nickel. * Add \$1.00 for 0.31-0.45 pct phos. † Intermediate low phos. ‡ Add \$1.00 for 0.31 to 0.50 pct phos.

Silvery iron: Buffalo, H1, \$78.50; Jackson, J1, 14 (Globe Div.), \$77.25; Niagara Falls (15.01-15.50), \$99.50; Kankak (14.01-14.50), \$110.00; (15.51-16.00), \$105.00. Add \$1.25 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 14 pct. Add \$1.00 for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron (under 1.0 pct phos.): \$64.00. Add \$1.00 premium for all grades silvery 6 pct to 14 pct.

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, re-rolling	21.25	22.75	22.25	24.25	—	26.00	38.25	31.00	35.50	—	16.00	27.75	16.25
Slabs, billets	26.00	29.00	27.00	30.25	30.75	32.00	47.50	38.50	44.75	—	20.75	—	21.00
Billets, forging	—	35.00	35.75	36.50	39.50	39.00	59.75	45.25	53.50	30.75	27.25	27.75	27.75
Bars, struct.	40.50	41.25	42.50	43.25	46.25	46.00	70.25	53.25	62.25	36.25	32.50	33.00	33.00
Plates	42.50	43.25	44.50	45.50	48.00	48.75	73.75	57.50	67.00	39.75	33.75	35.50	34.50
Sheets	46.75	47.25	49.25	50.00	—	53.25	78.25	63.00	76.25	46.50	38.75	46.50	39.25
Strip, hot-rolled	34.50	37.50	35.75	39.00	—	42.50	66.50	51.50	61.00	—	29.75	—	30.75
Strip, cold-rolled	43.25	47.25	45.75	50.00	—	53.25	78.25	63.00	76.25	46.50	38.75	46.50	39.25
Wire CF; Rod HR	—	39.25	40.25	41.00	44.00	43.75	66.75	50.50	59.25	34.50	31.00	31.50	31.50
			40.50	41.25			67.00	51.00	59.50				

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., C11; Brackenridge, Pa., A3; Butler, Pa., A7; Vandergrift, Pa., U1; Washington, Pa., W2, J2; Baltimore, Md., M1; Middletown, O., A7; Massillon, O., R3; Gary, U1; Bridgeville, Pa., U2; New Castle, Ind., I2; Ft. Wayne, Ind., J4; Philadelphia, D5.

Strip: Midland, Pa., C11; Waukegan, Cleveland, A5; Carnegie, Pa., S9; McKeesport, Pa., F1; Reading, Pa., C2; Washington, Pa., W2; W. Leeburg, Pa., A3; Bridgeville, Pa., U2; Detroit, A2; Canton-Massillon, O., R3; Harrison, N. J., D3; Youngstown, O., S5; Sharon, Pa., S1; Butler, Pa., A7; Wallingford, Conn., U3 (plus further conversion extras); W1; New Bedford, Mass. (25¢ per lb higher); R6; Gary, U1 (25¢ per lb higher).

Bar: Baltimore, A7; S. Duquesne, Pa., U1; Munhall, Pa., U1; Reading, Pa., C2; Titusville, Pa., U2; Washington, Pa., J2; McKeesport, Pa., U1; F1; Bridgeville, Pa., U2; Dunkirk, N. Y., A3; Massillon, O., R3; S. Chicago, U1; Syracuse, N. Y., C11; Watervliet, N. Y., A3; Waukegan, A5; Canton, O., T5; Ft. Wayne, Ind., J4; Philadelphia, D5; Detroit, R5; Gary, U1.

Wire: Waukegan, A5; Massillon, O., R3; McKeesport, Pa., F1; Ft. Wayne, Ind., J4; Harrison, N. J., D3; Baltimore, A7; Dunkirk, A3; Monesson, P1; Syracuse, C11; Bridgeville, U2.

Structurals: Baltimore, A7; Massillon, O., R3; Chicago, Ill., J4; Watervliet, N. Y., A3; Syracuse, C11; S. Chicago, U1.

Plates: Brackenridge, Pa., A3; Chicago, U1; Munhall, Pa., U1; Midland, Pa., C11; New Castle, Ind., I2; Middletown, A7; Washington, Pa., J2; Cleveland, Massillon, R3; Coatesville, Pa., C15; Philadelphia, D5; Vandergrift, Pa., U1; Gary, U1.

Forgings billets: Midland, Pa., C11; Baltimore, A7; Washington, Pa., J2; McKeesport, F1; Massillon, Canton, O., R3; Watervliet, A3; Pittsburgh, Chicago, U1; Syracuse, C11; Detroit, R5; Munhall, Pa., S. Chicago, U1.

Mills Not Buying, Prices Fall

The story is the same in all steelmaking centers: scrap isn't moving.

Weakness in midwest markets depresses prices elsewhere. Further drops may be on the way.

■ A fast weakening scrap market took another turn for the worse with a \$5 drop in the Pittsburgh market.

A few isolated signs of strength or firmness still occur. The East Coast somehow hopes for renewed export and the West Coast is still high and strong on the basis of shipments to Japan and a high steel operating rate.

But elsewhere, the market is in a virtual state of collapse. The talk in the Midwest is a \$40 floor before the drop comes to a halt. Whether it will reach that low ebb is anybody's guess.

There is evidence that the lower prices are drying up collections. But the mills are completely indifferent, talk about new, lower prices next time they buy.

Purchases are all in small quantities; many scarcely representative tonnages. But no real resistance has formed and the downtrend continues.

On the basis of moderate declines in Philadelphia and Chicago in addition to the major drop in Pittsburgh, THE IRON AGE Composite Price dropped \$2.34 to \$45.83, lowest level since July, 1956.

Pittsburgh — Scrap prices fell sharply as mills continue to avoid large purchases. Openhearth grades

are off \$5 to \$6. Turnings, railroad and cast grades are down \$2 to \$4. One mill bought No. 2 heavy melting for \$36 to \$38, depending on freight haul, and No. 2 bundles for \$34 to \$36. Tonnage reportedly was small. Drop in prices has cut dealer collections by as much as 50 pct, but the market continues to slide.

Chicago — Chicago prices again moved down. Reports that further auto production cuts are expected were followed by mill offers at lower prices. Despite the weak pricing, dealer stocks have not built up to any great extent. But the downward move continues, and brokers seem eager to sell.

Philadelphia — A weakening market was lead by a \$3 drop in low phos and electric furnace bundles prices. Decreases of \$1 and \$2 were reported for railroad grades, cupola cast, heavy turnings, No. 2 heavy melting, and No. 2 bundles. New orders were scarce. Most yard activity consisted of cleaning up old orders. In line with the general weakening market, all steelmaking grades declined \$1.

New York — The market remains quiet, with little export and little domestic activity. Cleaning up old orders is the extent of business in the market. Export is weak, but is still the main prop here.

Detroit — Steelmaking and blast furnace grades dropped another \$1 this week. The market is getting softer as the time for bidding on auto lists draws closer.

Cleveland — First of local auto lists went at a shade under \$43, or \$4 under a month ago. The same mill which purchased a moderate tonnage of No. 2 bundles a week ago for \$37 got another load last week at \$34. Market interest is sluggish with no mills indicating intention to buy.

St. Louis — The depressed market is reflected in price decreases of from \$2 to \$2.50 in openhearth grades. It is expected that lower prices will further slow the movement of scrap.

Birmingham — All segments of the market continue downward, with buying very slow. There is no market for No. 1 heavy melting and only negligible amounts of No. 2 are being taken by an Atlanta mill. Some brokers are sending No. 2 bundles to northern markets.

Cincinnati — The local market is off \$1 on appraisal and will probably drop a little further. Biggest interest is in trying to reach Pittsburgh by barge. For a price, a market can be found there, while there is no local market.

Buffalo — All steelmaking grades are down \$3 in a badly sagging market. Railroad and low phos grades are also down \$3, with turnings down \$2. There are no new orders now and advent of good weather could mean an early start of the Great Lakes shipping.

Boston — The decline continues here, with no expectation of any real firming in the near future. The trade is faced with no export activity, no New England purchases, and no buys from Pennsylvania mills.

West Coast — This region continues to be the exception to the downward rule. Forces that have slashed prices elsewhere are more than offset here. Prices are holding firm. Export activity continues brisk and is a prime price prop. Mill operating rate is strong.

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SCRAP PRICES (Effective March 26, 1957)

Pittsburgh

No. 1 hvy. melting	\$14.00 to \$15.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 dealer bundles	44.00 to 45.00
No. 1 factory bundles	47.00 to 48.00
No. 2 bundles	35.00 to 36.00
No. 1 busheling	44.00 to 45.00
Machine shop turn.	31.00 to 32.00
Mixed bor. and turn.	31.00 to 32.00
Shoveling turnings	35.00 to 36.00
Cut iron borings	35.00 to 36.00
Low phos. punch's plate	47.00 to 48.00
Heavy turnings	38.00 to 39.00
No. 1 RR hvy. melting	47.00 to 48.00
Scrap rails, random lgth.	63.00 to 64.00
Rails 2 ft and under	66.00 to 67.00
RR steel wheels	64.00 to 65.00
RR spring steel	64.00 to 65.00
RR couplers and knuckles	64.00 to 65.00
No. 1 machinery cast.	50.00 to 51.00
Cupola cast.	43.00 to 44.00
Heavy breakable cast.	41.00 to 42.00

Chicago

No. 1 hvy. melting	\$12.00 to \$13.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	43.00 to 44.00
No. 1 factory bundles	48.00 to 49.00
No. 2 bundles	35.00 to 36.00
No. 1 busheling	42.00 to 43.00
Machine shop turn.	27.00 to 28.00
Mixed bor. and turn.	29.00 to 30.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	29.00 to 30.00
Low phos. forge crops	56.00 to 57.00
Low phos. punch's plate	50.00 to 51.00
Low phos. 3 ft and under	49.00 to 50.00
No. 1 RR hvy. melting	18.00 to 19.00
Scrap rails, random lgth.	55.00 to 56.00
Rolling rails	59.00 to 60.00
Rails 2 ft and under	58.00 to 59.00
Locomotive tires cut	53.00 to 54.00
Cut holsters & side frames	51.00 to 52.00
Angles and splice bars	56.00 to 57.00
RR steel car axles	72.00 to 73.00
RR couplers and knuckles	50.00 to 51.00
No. 1 machinery cast.	47.00 to 48.00
Cupola cast.	41.00 to 42.00
Heavy breakable cast.	40.00 to 41.00
Cast iron brake shoes	41.00 to 42.00
Cast iron wheels	49.00 to 50.00
Malleable	57.00 to 58.00
Stove plate	41.00 to 42.00
Steel car wheels	53.00 to 54.00

Philadelphia Area

No. 1 hvy. melting	\$50.00 to \$51.00
No. 2 hvy. melting	41.00 to 42.00
No. 1 dealer bundles	50.00 to 51.00
No. 2 bundles	29.00 to 30.00
No. 1 busheling	50.00 to 51.00
Machine shop turn.	40.00 to 41.00
Mixed bor. and turn.	42.00 to 43.00
Cast iron borings	42.00 to 43.00
Shoveling turnings	41.00 to 42.00
Clean cast chem. borings	45.00 to 46.00
Low phos. 3 ft and under	54.00 to 55.00
Low phos. 2 ft and under	53.00 to 54.00
Low phos. punch's	55.00 to 56.00
Elec. furnace bundles	63.00 to 64.00
Heavy turnings	47.00 to 48.00
RR steel wheels	62.00 to 63.00
RR spring steel	63.00 to 64.00
Rails 18 in. and under	70.00 to 71.00
Cupola cast.	43.00 to 44.00
Heavy breakable cast.	55.00 to 56.00
Cast iron car wheels	61.00 to 62.00
Malleable	63.00 to 64.00
Unstripped motor blocks	41.00 to 42.00
No. 1 machinery cast.	55.00 to 56.00

Cleveland

No. 1 hvy. melting	\$41.00 to \$42.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 dealer bundles	41.00 to 42.00
No. 1 factory bundles	44.50 to 45.50
No. 2 bundles	33.00 to 34.00
No. 1 busheling	41.00 to 42.00
Machine shop turn.	25.00 to 26.00
Mixed bor. and turn.	28.50 to 29.50
Shoveling turnings	28.50 to 29.50
Cast iron borings	28.50 to 29.50
Cut structural plates, 2 ft & under	50.00 to 51.00
Drop forge flashings	41.00 to 42.00
Low phos. punch's, plate	42.00 to 43.00
Foundry steel, 2 ft & under	50.00 to 51.00
No. 1 RR heavy melting	49.00 to 50.00
Rails 2 ft and under	69.00 to 70.00
Rails 18 in. and under	70.00 to 71.00
Railroad grate bars	55.00 to 56.00
Steel axle turnings	52.00 to 53.00
Railroad cast.	57.00 to 58.00
No. 1 machinery cast.	52.00 to 53.00
Stove plate	49.00 to 50.00
Malleable	55.00 to 56.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	\$44.00 to \$45.00
No. 2 hvy. melting	40.00 to 41.00
No. 1 dealer bundles	44.00 to 45.00
No. 2 bundles	36.00 to 37.00
Machine shop turn.	25.00 to 26.00
Shoveling turnings	31.00 to 32.00
Cast iron borings	31.00 to 32.00
Low phos. plate	45.00 to 46.00

Buffalo

No. 1 hvy. melting	\$43.00 to \$44.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 busheling	43.00 to 44.00
No. 1 dealer bundles	43.00 to 44.00
No. 2 bundles	34.00 to 35.00
Machine shop turn.	27.00 to 28.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	32.00 to 33.00
Cast iron borings	30.00 to 31.00
Low phos. plate	48.00 to 49.00
Scrap rails, random lgth.	58.00 to 59.00
Rails 2 ft and under	62.00 to 63.00
RR steel wheels	51.00 to 52.00
RR spring steel	51.00 to 52.00
RR couplers and knuckles	51.00 to 52.00
No. 1 machinery cast.	49.00 to 50.00
No. 1 cupola cast.	45.00 to 46.00

Detroit

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$40.00 to \$41.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 dealer bundles	40.00 to 41.00
No. 2 bundles	31.00 to 32.00
No. 1 busheling	40.00 to 41.00
Drop forge flashings	39.50 to 40.50
Machine shop turn.	24.00 to 25.00
Mixed bor. and turn.	27.00 to 28.00
Shoveling turnings	27.00 to 28.00
Cast iron borings	27.00 to 28.00
Low phos. punch's, plate	40.00 to 41.00
No. 1 cupola cast.	46.00 to 47.00
Heavy breakable cast.	44.00 to 45.00
Stove plate	45.00 to 46.00
Automotive cast.	54.00 to 55.00

St. Louis

No. 1 hvy. melting	\$45.00 to \$46.00
No. 2 hvy. melting	41.00 to 42.00
No. 1 dealer bundles	45.00 to 46.00
No. 2 bundles	35.00 to 36.00
Machine shop turn.	29.00 to 30.00
Cast iron borings	31.00 to 32.00
Shoveling turnings	31.00 to 32.00
No. 1 RR hvy. melting	47.00 to 48.00
Rails, random lengths	55.00 to 56.00
Rails 18 in. and under	67.00 to 68.00
Locomotive tires uncut	50.00 to 51.00
Angles and splice bars	54.00 to 55.00
Std. steel car axles	70.00 to 71.00
RR specialties	53.00 to 54.00
Cupola cast.	43.00 to 44.00
Heavy breakable cast.	40.00 to 41.00
Cast iron brake shoes	46.00 to 47.00
Stove plate	40.00 to 41.00
Cast iron car wheels	46.00 to 47.00
Rolling rails	61.00 to 62.00
Unstripped motor blocks	38.00 to 39.00

Boston

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$40.00 to \$41.00
No. 2 hvy. melting	33.00 to 34.00
No. 1 dealer bundles	40.00 to 41.00
No. 2 bundles	31.00 to 32.00
No. 1 busheling	43.00 to 44.00
Elec. furnace, 3 ft & under	47.00 to 48.00
Machine shop turn.	24.00 to 25.00
Mixed bor. and short turn.	27.00 to 28.00
Shoveling turnings	29.00 to 30.00
Clean cast chem. borings	30.00 to 31.00
No. 1 machinery cast.	44.00 to 45.00
Mixed cupola cast.	37.00 to 38.00
Heavy breakable cast.	45.00 to 46.00
Stove plate	36.00 to 37.00
Unstripped motor blocks	29.00 to 30.00

New York

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$45.00 to \$46.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 dealer bundles	32.00 to 33.00
Machine shop turn.	28.00 to 29.00
Mixed bor. and turn.	30.00 to 31.00
Shoveling turnings	33.00 to 34.00
Clean cast chem. borings	31.00 to 32.00
No. 1 machinery cast.	42.50 to 43.50
Mixed yard cast.	42.50 to 43.50
Charging box cast.	46.00 to 47.00
Heavy breakable cast.	46.00 to 47.00
Unstripped motor blocks	32.00 to 33.00

Birmingham

No. 1 hvy. melting	\$41.00 to \$42.00
No. 2 hvy. melting	36.00 to 37.00
No. 1 dealer bundles	42.00 to 43.00
No. 2 bundles	34.00 to 35.00
No. 1 busheling	42.00 to 43.00
Machine shop turn.	33.00 to 34.00
Shoveling turnings	35.00 to 36.00
Cast iron borings	27.00 to 28.00
Electric furnace bundles	48.00 to 49.00
Bar crops and plate	50.00 to 51.00
Structural and plate, 2 ft.	49.00 to 50.00
No. 1 RR hvy. melting	48.00 to 49.00
Scrap rails, random lgth.	50.00 to 51.00
Rails, 18 in. and under	57.00 to 58.00
Angles & splice bars	55.00 to 56.00
Rolling rails	60.00 to 61.00
No. 1 cupola cast.	48.50 to 49.50
Stove plate	47.00 to 48.00
Charging box cast.	37.00 to 38.00
Cast iron car wheels	37.00 to 38.00
Unstripped motor blocks	38.00 to 39.00
Mashed tin cans	15.00 to 16.00
Elec. furnace, 2 ft & under	46.00 to 47.00

Cincinnati

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$42.00 to \$43.00
No. 2 hvy. melting	36.00 to 37.00
No. 1 dealer bundles	42.00 to 43.00
No. 2 bundles	32.00 to 33.00
Machine shop turn.	30.00 to 31.00
Mixed bor. and turn.	29.00 to 30.00
Shoveling turnings	32.00 to 33.00
Cast iron borings	30.00 to 31.00
Low phos. 18 in. & under	52.00 to 53.00
Rails, random lengths	57.00 to 58.00
Rails, 18 in. and under	67.00 to 68.00
No. 1 cupola cast.	43.00 to 44.00
Hvy. breakable cast.	41.00 to 42.00
Drop broken cast.	55.00 to 56.00

San Francisco

No. 1 hvy. melting	\$55.00
No. 2 hvy. melting	50.00
No. 1 dealer bundles	54.00
No. 2 bundles	38.00
Machine shop turn.	35.00
Cast iron borings	35.00
No. 1 RR hvy. melting	55.00
No. 1 cupola cast.	57.00

Los Angeles

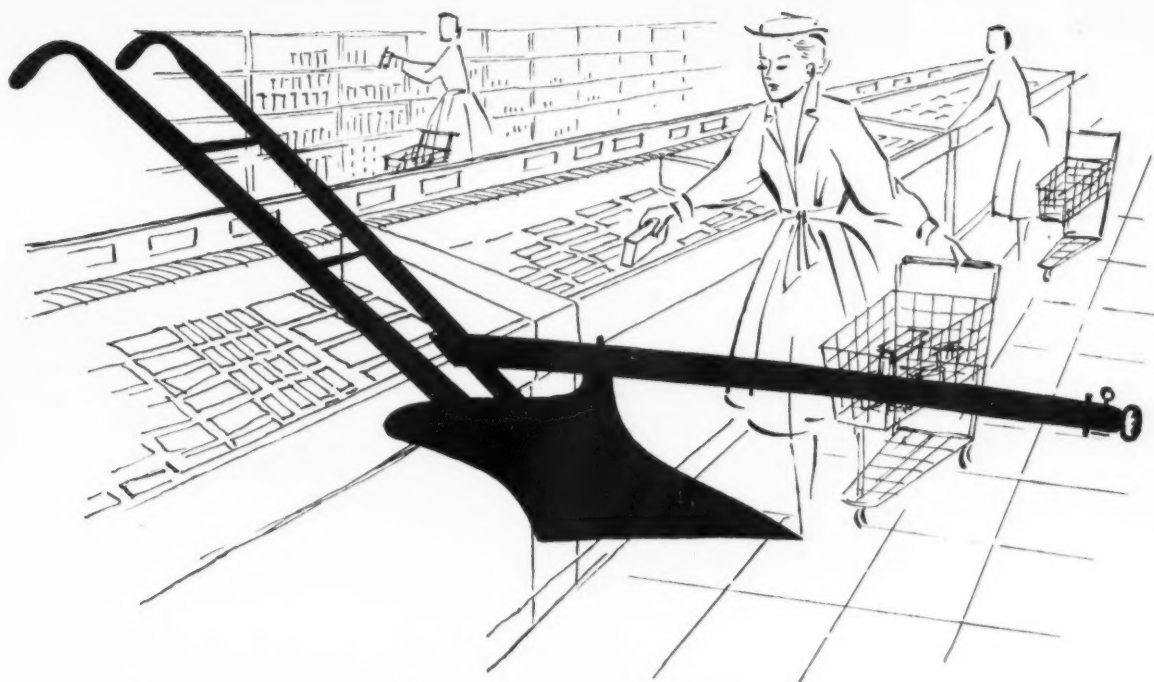
No. 1 hvy. melting	\$55.00
No. 2 hvy. melting	51.00
No. 1 dealer bundles	54.00
No. 2 bundles	36.00
Machine shop turn.	35.00
Shoveling turnings	37.00
Cast iron borings	34.00
Elec. furn. 1 ft. and under (foundry)	66.00
No. 1 RR hvy. melting	55.00
No. 1 cupola cast.	\$59.00 to 60.00

Seattle

No. 1 hvy. melting	\$55.00
No. 2 hvy. melting	51.00
No. 2 bundles	\$31.00 to 34.00
No. 1 cupola cast.	55.00
Mixed yard cast.	55.00

Hamilton Ont.

No. 1 hvy. melting	\$48.00
No. 2 hvy. melting	43.00
No. 1 dealer bundles	48.00
No. 2 bundles	37.00
Mixed steel scrap	40.00
Busheling	34.00
Bush, new fact., prep'd.	46.00
Bush, new fact., unprep'd.	42.00
Machine shop turn.	27.00
Short steel turn.	33.00
Mixed bor. and turn.	24.00
Rails, rerolling	54.00
Cast scrap	50.00



farms, factories, freezers

• Even before the days of written history man's food supply depended upon iron and steel to provide better plows and sharper sickles. His iron axes and knives have been found among ancient implements near Lake Hallstatt in Austria.

In more modern times, a kettle of about one quart capacity, made in Lynn, Massachusetts, in 1644, was the first iron casting produced in America. In 1819 a

cast iron plow was patented by Jethro Wood of Cayuga County, New York.

To provide, process and prepare food—for cultivators on the farm, machinery in the packing plant, cooking ranges in the kitchen—now, more than ever, the multi-billion dollar food industry depends upon steel. And to maintain an adequate tonnage from the mills, an uninterrupted flow of scrap is indispensable.

*For the purchase or sale of iron
or steel scrap . . . phone or
write "Your Chicago Broker"*

M. S.
KAPLAN
COMPANY

231 S. La Salle St., Chicago • Telephone ANdover 3-3900

Copper Price Threat To Output

Anaconda head says big chunk of U. S. copper production costs 29¢ or more.

Announces low profit margin is shutting two mines.

Some custom smelters cut prices to promote business.

■ Evidence that copper producers will resist pressure for a further price reduction is offered by Roy H. Glover, chairman of the board, The Anaconda Co.

Mr. Glover told a group of security analysts in Boston that 22.6 pct of 1956 domestic copper cost 29¢ or more per lb to produce. This tonnage is "indispensable to our economy," he said. "Nevertheless, on the basis of present prices there is not a sufficient margin of profit to justify mining risks."

Output Drop—The Anaconda chairman predicts, "Unless we head into a period of greatly slackened industrial activity, the inevitable result of the relationship between present costs and prices will be to dry up production at the high cost properties. . . ."

Mr. Glover indicated this had already begun. Anaconda's Belmont Mine, Butte, Mont., has ceased operations. And the company is in process of suspending output at its Montain Consolidated Mine. Total output of the two was about 2000 tons of copper per month.

The other members of the Big 3 copper producers indicate they have no plans for closing any of their domestic properties.

Cost Study—The study of high cost operations was spurred by

many ("in good faith but without adequate information") statements made by an African producer and others underrating costs of domestic operations. The Anaconda survey covered every copper producing property in the U. S. Based on 1956 production, Anaconda found

COST	OUTPUT
30¢ or more	13.9 pct 150,965 tons
29¢ or more	22.6 pct 245,484 tons
25¢ or more	33.1 pct 359,451 tons

These costs consider only normal depreciation, says Mr. Glover, and do not make allowances for reserves depletion. There is, he concedes, a wide variation between high cost and low cost production.

Custom Smelter—Some sales of custom smelter copper have been reported at 30.5¢, down ½¢ per lb. Several major smelters say they have done no business at the new levels. But it is likely that they will since tonnages involved are reported to be substantial.

Tin

The battle in the International Tin Agreement Council over whether to bump floor and ceiling prices of the buffer stock was short, but not so sweet for U. S. consumers.

After a three-day session behind closed doors the Council announced it had decided unanimously to increase the floor price by 1¼¢. The ceiling price is unchanged.

The new regulations defining buffer stock action are:

Tin price (per lb)	Action
Over \$1.10	Manager must sell
\$1.03¾ to \$1.10	Manager may sell
97½¢ to \$1.03¾	No action possible
91¼¢ to 97½¢	Manager may buy
Below 91¼¢	Manager must buy

For previous limits see IRON AGE, March 21, 1957, page 150.

The spot price in the U. S. reacted as had been expected. It immediately topped \$1.00 per lb. Major tin traders generally agree that it will stay there for some time. One broker expects it to remain fairly permanently in the \$1.00 to \$1.05 per lb range.

Called a Stick-Up—He calls the action of the ITA a "stick-up" of the U. S. consumer. The reason: Consumption of tin in the U. S., world's largest user, remains fairly constant despite price fluctuation. A vast majority of the International Tin Agreement members stand to gain by the hike—all the producers,

Primary Prices

(cents per lb)	Current price	last price	date of change
Aluminum ingot	27.10	25.90	8/10/56
Aluminum pig	25.00	24.00	8/10/56
Copper (E)	32.00	34.00	2/18/57
Copper (CS)	30.50	31.00	3/26/57
Copper (L)	32.00	34.00	2/19/57
Lead, St. L.	15.80	16.30	1/13/56
Lead, N. Y.	16.00	16.50	1/13/56
Magnesium ingot	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	64.50	12/8/56
Titanium sponge	250-275	270-300	12/4/56
Zinc, E. St. L.	13.50	13.00	1/6/56
Zinc, N. Y.	14.00	13.50	1/6/56

ALUMINUM: 99% ingot frt allwd. **COPPER:** (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. **LEAD:** common grade. **MAGNESIUM:** 99.8% pig. Velasco, Tex. **NICKEL:** Port Colbourne, Canada. **ZINC:** prime western. **TIN:** see column at right, other primary prices, pg. 154.

and several of the major consumers which export tin from smelters within their borders. U. S. is not a member.

This trader says the current market has great strength, but is running scared.

Another New York tin trader believes the alteration may accomplish its purpose—getting some tin for the buffer stock. He says the price may drop low enough for the buffer stock manager to buy during the normally slack summer. If this does happen it won't be for long, he says. It will take some time to get enough metal to make the buffer stock workable.

Aluminum

J. M. Wardle, formerly director of engineering and water resources for Canada, has announced a plan to expand Canadian production of aluminum.

Mr. Wardle told the Institution of Civil Engineers, London, that reversing the flow of the upper reaches of the Yukon River would provide 5 million horsepower of electricity.

U. S. Must OK—This he proposes be used for aluminum production, and for developing the region's nickel and lead. Since over 1100 of the 1700 mile length of the Yukon River is in Alaska it would require the agreement of the U. S. It would mean more metal for the U. S. from Canada.

However, such a project is many years away. Aluminium Ltd., has a capacity of 582,000 tons in the Quebec Area with about half as much power. To put up facilities to make aluminum from even half the proposed 5 million horsepower would cost in the neighborhood of \$873 million, not including the necessary town and railroad or dock facilities.

Tin prices for the week: March 20—99.875; March 21—100; March 22—100.375; March 25—102.00; March 26—102.00.*

* Estimate

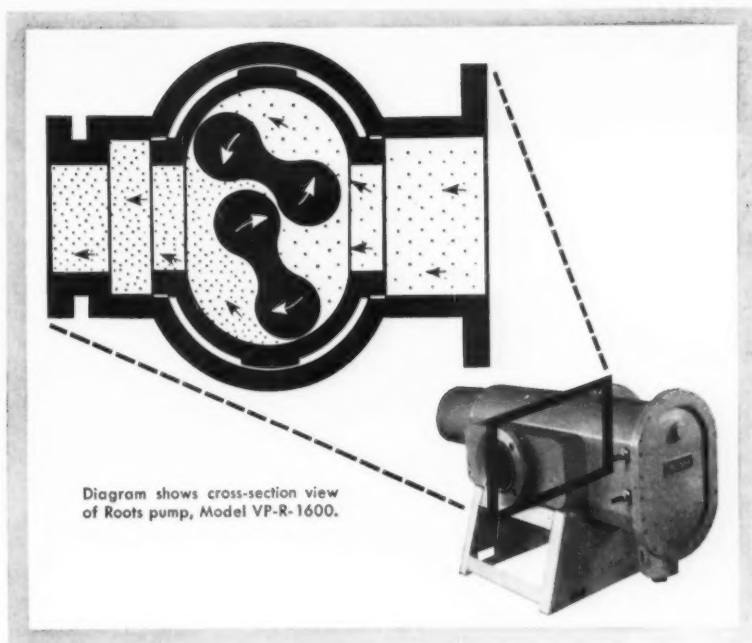


Diagram shows cross-section view of Roots pump, Model VP-R-1600.

How to get vapor-free high vacuum fast... with the ROOTS pump

Now you can achieve completely dry pressure in the 10^{-1} to 10^{-5} mm Hg range using only a *mechanical* high-vacuum pump.

Probably the world's fastest pump in this range, the new Roots pump works without the aid of oil or steam vapors.

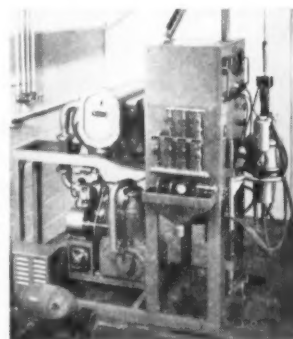
A pair of finely machined rotary pistons do the pumping. The pistons never touch one another or the pump casing, so the Roots pump needs no oil sealing. It cannot contaminate a system with backstreaming vapors.

Consider these other advantages:

- 1. Speed.** The model shown above has a throughput of 10,400 micron cu. ft. per minute at 10 microns.
- 2. No shaft seals, no leaks.** Motor operates within the vacuum.
- 3. No by-pass or valving.** Roughing is done directly *through* the pump.
- 4. Quiet.** The Roots pump does not vibrate when in operation.
- 5. Low power consumption.**

Under a license with the manufacturer, Heraeus (Hanau, Germany), CEC is exclusive agent for all seven models of the Roots pump in this country.

For data on performance and theory of operation, write for Bulletin PS-20.



Heraeus Vacuum Arc Melting Furnaces are also available from CEC. Note Roots pump used. Furnace melts "buttons" to ingots. Particularly useful for obtaining pure samples of metals with high melting points. Information in Bulletin P4-28.



Consolidated ElectroDynamics
Rochester Division, Rochester 3, N. Y.
formerly Consolidated Vacuum

OFFICES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

NONFERROUS PRICES (Effective March 26, 1957)

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136	.250
1800, 1100, 3003	44.3	42.1	40.9	40.2
5052	51.8	46.8	45.1	42.9
6061-0	48.9	44.6	42.8	42.6

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6-8	42.7-44.4	57.6-61.1
12-14	43.4-44.8	58.4-62.7
24-26	46.4-46.9	68.7-73.1
36-38	54.8-55.4	91.5-94.9

Screw Machine Stock—2011-T-3

Size"	3/4	5/8	3/4-1	1 1/4-1 1/2
Price	59.7	58.8	57.4	55.2

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"	72	96	120	144
.019 gage	\$1.352	\$1.803	\$2.254	\$2.704
.024 gage	1.686	2.252	2.815	3.378

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type	Gage	250	250	188	081	032
AZ31B Stand, Grade		67.9	69.0	77.9	103.1	
AZ31B Spec.		93.3	95.7	108.7	171.3	
Tread Plate		70.6	71.7			
Tooling Plate	73.0					

Extruded Shapes

Factor	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	69.6	70.7	75.6	89.2
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) 37.25 (delivered)
AZ93A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	126	106	128
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	120	105	121
Seamless tube	157	129	200
Shot, blocks		87	

COPPER, BRASS, BRONZE

(Freight included on 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	54.13	51.36	54.32	
Brass, 70/30	47.52	48.06	47.46	50.43
Brass, Low	50.20	50.74	50.14	53.01
Brass, R L	51.14	51.68	51.08	53.95
Brass, Naval	51.69	49.00	55.10	
Muntz Metal	49.79	45.60		
Comm. Br.	52.63	53.17	52.57	55.19
Mang. Br.	55.43	49.53		
Phos. Br. 5%	73.17	73.67		
Free Cutting Brass Rod				\$37.65

TITANIUM

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, \$11.00-\$12.10; alloy, \$14.75; Plate, HR, commercially pure, \$9.25-\$9.75; alloy, \$11.25. Wire, rolled and/or drawn, commercially pure, \$8.50-\$9.00; alloy, \$11.00; Bar, HR or forged, commercially pure, \$7.10-\$7.35; alloy, \$7.10-\$7.30; billets, HR, commercially pure, \$6.85-\$7.10; alloy, \$6.85-\$7.05.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Antimony, American, Laredo, Tex. \$3.50
Beryllium aluminum 5% Be, Dollar per lb contained Be \$74.75
Beryllium copper, per lb cont'd Be \$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading \$71.50
Bismuth, ton lots \$3.36
Cadmium, del'd \$1.70
Calcium, 99.9%, small lots \$4.68
Chromium, 99.8% metallic basis \$1.31
Cobalt, 97-99% (per lb) \$2.00 to \$3.07
Germanium, per gm, f.o.b. Miami, Okla. refined \$48.50-\$53.50
Gold, U. S. Treas. per troy oz. \$386.00
Indium, 99.9% dollars per troy oz. \$3.38
Iridium, dollars per troy oz. \$90 to \$100
Lithium, 98% \$11.00 to \$14.00
Magnesium, sticks, 100 to 500 lb \$9.00
Mercury, dollars per 76-lb flask, f.o.b. New York \$255 to \$267
Nickel oxide sinter at Copper Cliff, Ont. contained nickel \$71.25
Palladium, dollars per troy oz. \$23 to \$24
Platinum, dollars per troy oz. \$92 to \$95
Rhodium \$120.00 to \$125.00
Silver ingots (\$ per troy oz.) \$13.75
Thorium, per kg. \$43.00
Uranium, normal per kg. \$40.00
Vanadium \$3.45
Zirconium sponge \$10.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
No. 115 31.50
No. 120 30.00
No. 123 28.50
80-10-10 ingot
No. 305 35.50
No. 315 33.50
88-10-2 ingot
No. 210 43.25
No. 215 40.00
No. 245 35.50
Yellow ingot
No. 405 25.25
Manganese bronze
No. 421 28.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 24.75-25.50
0.60 copper max. 24.50-25.25
Piston alloys (No. 122 type) 22.25-23.50
No. 12 alum. (No. 2 grade) 22.50-23.50
108 alloy 22.50-23.50
195 alloy 24.50-25.75
13 alloy (0.60 copper max.) 24.50-25.25
ANS-679 22.50-23.50

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1-95-97 1/2% 23.00-23.75
Grade 2-92-95% 21.75-22.00
Grade 3-90-92% 20.75-21.50
Grade 4-85-90% 20.25-20.75

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	25	27 1/2
Yellow brass	21 1/2	20 1/2
Red brass	25	24 1/2
Comm. bronze	25 1/2	25 1/2
Mang. bronze	20 1/2	19 1/2
Yellow brass rod ends	21 1/2	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26 1/2
No. 2 copper wire	25
Light copper	22 1/2
*Refinery brass	24 1/2
Copper bearing material	23 1/2
*Dry copper content	

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26 1/2
No. 2 copper wire	25
Light copper	22 1/2
No. 1 composition	23 1/2
No. 1 comp turnings	23
Hvy. yellow brass solids	17 1/2
Brass pipe	20
Radiators	18

Mixed old cast.	14 1/2-15
Mixed new clips	15 1/2-16 1/2
Mixed turnings, dry	14 1/2-15 1/2

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	23 1/2-24
No. 2 copper wire	22-23 1/2
Light copper (unsweated)	15-15 1/2
Auto radiators (unsweated)	20-20 1/2
No. 1 composition	20 1/2-21
No. 1 composition turnings	20-20 1/2
Cocks and faucets	16-16 1/2
Clean heavy yellow brass	14-14 1/2
Brass pipe	16 1/2-17
New soft brass clippings	18 1/2-19
No. 1 brass rod turnings	15 1/2-16

Aluminum

Alum. pistons and struts	5-5 1/2
Aluminum crankcases	10-10 1/2
1100 (2S) aluminum clippings	13 1/2-14
Old sheet and utensils	10-10 1/2
Borings and turnings	6 1/2-7
Industrial castings	10-10 1/2
2024 (24S) clippings	11 1/2-12

Zinc

New zinc clippings	6 1/2-7
Old zinc	4 1/2-5
Zinc routings	2 1/2-2 3/4
Old die cast scrap	2 1/2-2 3/4

Nickel and Monel

Pure nickel clippings	\$1.55-\$1.65
Clean nickel turnings	\$1.30-\$1.40
Nickel anodes	\$1.55-\$1.65
Nickel rod ends	\$1.55-\$1.65
New Monel clippings	20-25
Clean Monel turnings	55-60
Old sheet Monel	65-70
Nickel silver clippings, mixed	21
Nickel silver turnings, mixed	18

Lead

Soft scrap lead	12-12 1/2
Battery plates (dry)	6 1/2-6 3/4
Batteries, acid free	3 1/2-4

Miscellaneous

Block tin	75-76
No. 1 pewter	59-60
Auto babbitt	39-40
Mixed common babbitt	12-12 1/2
Solder joints	17 1/2-18
Siphon tops	42
Small foundry type	14 1/4-14 1/2
Monotype	14-14 1/4
Lino. and stereotype	13-13 1/2
Electrotype	12 1/2-12 3/4
Hand picked type shells	9 1/2-10
Lino. and stereo. dross	4 1/2-5
Electro. dross	4-4 1/2

IRON AGE

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

**STEEL
PRICES**(Effective
March 26, 1957)

		BILLETS, BLOOMS, SLABS			PIL- ING	SHAPES STRUCTURALS			STRIP					
		Carbon Re-rolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton		Carbon	Hi Str. Low Alloy	Carbon Wide- Flange	Hot- rolled	Cold- rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot- rolled	Alloy Cold- rolled
EAST	Bethlehem, Pa.			\$107.00 B3		5.05 B3	7.40 B3	5.05 B3						
	Buffalo, N. Y.	\$74.00 B3, R3	\$91.50 B3, R3	\$107.00 B3, R3	5.90 B3	5.05 B3	7.40 B3	5.05 B3	4.675 B3, R3	6.85 R7	6.95 B3			
	Claymont, Del.													
	Harrison, N. J.													14.55 C11
	Conschocken, Pa.		\$96.50 A2	\$114.00 A2					4.725 A2	6.90 A2	6.95 A2			
	New Bedford, Mass.									7.30 R6				
	Johnstown, Pa.	\$74.00 B3	\$91.50 B3	\$107.00 B3		5.05 B3	7.40 B3							
	Boston, Mass.									7.40 T8				14.90 T8
	New Haven, Conn.									7.30 D1				
	Baltimore, Md.									6.85 T8				
	Phoenixville, Pa.					5.85 P2		5.85 P2						
	Sparrows Pt., Md.								4.675 B3		6.95 B3			
	Bridgeport, Wallingford, Conn.	\$79.00 N8	\$96.50 N8	\$107.00 N8						7.30 W1 6.95 N8				
	Pawtucket, R. I. Worcester, Mass.									7.48 A5,N7				14.90 N7
MIDDLE WEST	Alton, Ill.								4.875 L1					
	Ashland, Ky.								4.675 A7					
	Canton-Massillon, Dover, Ohio		\$94.00 R3	\$107.00 R3, T5						6.85 G4		10.10 G4		14.55 G4
	Chicago, Ill. Franklin Park, Ill.	\$74.00 U1, R3	\$91.50 U1, R3,W8	\$107.00 U1, R3,W8	5.90 U1	5.00 U1,W8 5.00 P13	7.35 U1,Y1 6.00 W8	5.00 U1	4.675 N4 4.675 A1	6.95 A1,T8			7.75 W8, S9	14.55 A1, S9,T8
	Cleveland, Ohio									6.85 A5,J3			7.75 J3	
	Detroit, Mich.			\$107.00 R5					4.775 G3, M2	6.95 M2,G3, D2,P11	7.05 G3	10.10 G3, D2	7.75 G3	
	Anderson, Ind.									6.85 G4		10.10 G4		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	\$74.00 U1	\$91.50 U1	\$107.00 U1, Y1	5.90 I3	5.00 U1	7.35 U1,I3	5.25 I3	4.675 U1, I3,Y1	6.85 Y1	6.95 U1, I3,Y1	10.20 Y1	7.75 U1, Y1	
	Sterling, Ill.	\$74.00 N4							4.775 N4					
	Indianapolis, Ind.									7.00 C5				
	Newport, Ky.												7.75 A9	
	Middletown, Ohio													
WEST	Niles, Warren, Ohio Sharon, Pa.		\$91.50 S1, C10	\$107.00 S1, C10					4.675 S1, R3	6.85 T4	6.95 S1, R3	10.00 S1, R3	7.75 S1	14.55 S1
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	\$74.00 U1	\$91.50 U1, C11	\$107.00 U1, C11	5.90 U1	5.00 U1, J3	7.35 U1, J3	5.00 U1	4.675 P6	5.750 P6 6.85 J3,B4, S7			7.75 S9	14.55 S9
	Portsmouth, Ohio													
	Weirton, Wheeling, Follansbee, W. Va.					5.00 W3			4.675 W3	6.85 W3,F3	6.95 W3	9.65 W3		
	Youngstown, Ohio	\$74.00 R3	\$91.50 Y1, C10	\$107.00 Y1			7.35 Y1		4.675 U1, Y1	6.85 Y1,C5	6.95 U1, Y1	10.20 Y1	7.75 U1, Y1	
	Fontana, Cal.	\$83.50 K1	\$101.00 K1	\$128.00 K1		5.75 K1	8.10 K1	5.90 K1	5.525 K1	8.70 K1				
	Geneva, Utah		\$91.50 C7			5.00 C7	7.35 C7							
	Kansas City, Mo.					5.10 S2	7.45 S2		4.925 S2		7.20 S2			
	Los Angeles, Torrance, Cal.		\$101.00 B2	\$127.00 B2		5.70 C7, B2	8.05 B2		5.425 B2, C7	8.90 C1			8.95 B2	
	Minneapolis, Colo.					5.30 C6			5.775 C6					
SOUTH	Portland, Ore.					5.75 O2								
	San Francisco, Niles, Pittsburg, Cal.		\$101.00 B2			5.65 B2	8.00 B2		5.425 C7,B2					
	Seattle, Wash.		\$105.00 B2			5.75 B2	8.10 B2		5.675 B2					
	Atlanta, Ga.								4.875 A8					
	Fairfield, Ala. City, Birmingham, Ala.	\$74.00 T2	\$91.50 T2			5.00 T2,R3 5.25 C16	7.35 T2		4.675 T2,R3 4.975 C10 4.925 C16		6.95 T2			
	Houston, Lone Star, Texas	\$80.00 L3	\$96.50 S2	\$112.00 S2		5.10 S2	7.45 S2		4.925 S2		7.20 S2			

IRON AGE

STEEL
PRICES(Effective
March 26, 1957)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

STEEL PRICES <i>(Effective March 26, 1957)</i>		SHEETS								WIRE ROD	TINPLATE†		BLACK PLATE	
		Hot-rolled 18 ga. & hyvr.	Cold-rolled	Galvanized	Enamel-ing	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled 19 ga.	Cokes* 1.25-lb. base box	Electro* 0.25-lb. base box	Holloware Enameling 29 ga.	
EAST	Bethlehem, Pa.													
	Buffalo, N. Y.	4.675 B3	5.75 B3				6.90 B3	8.525 B3			5.80 W6	† Special coated mfg. terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct \$2.20 from 1.25-lb. coke base box. * COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add \$1.00. Differ-ential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.													
	Coatesville, Pa.													
	Conschohecken, Pa.	4.725 A2	5.80 A2				6.95 A2							
	Harriburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.									5.80 B3				
	Fairless, Pa.	4.725 U1	5.80 U1				6.95 U1	8.575 U1			\$9.80 U1	\$8.50 U1		
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	4.675 B3	5.75 B3	6.30 B3			6.90 B3	8.575 B3	9.275 B3		5.90 B3	\$9.80 B3	\$8.50 B3	
Worcester, Mass.										6.10 A5				
Trenton, N. J.														
MIDDLE WEST	Alton, Ill.										6.00 L1			
	Ashland, Ky.	4.675 A7		6.30 A7	6.325 A7									
	Canton-Massillon, Dovor, Ohio			6.30 R3,R1										
	Chicago, Joliet, Ill.	4.675 W8, A1					6.90 U1			5.80 K2	5.80 A5, R3, N4, W8, K2			
	Sterling, Ill.										5.90 N4, K2			
	Cleveland, Ohio	4.675 J3, R3	5.75 J3, R3		6.325 R3		6.90 R3	8.525 R3, J3			5.80 A5			
	Detroit, Mich.	4.775 G3, M2	5.85 G3 5.75 M2				7.00 G2	8.625 G3						
	Newport, Ky.	4.675 A9	5.75 A9											
	Gary, Ind. Harbor, Indiana	4.675 U1, I3, Y1	5.75 U1, I3, Y1	6.30 U1, I3	6.325 U1, I3, Y1	6.70 U1	6.90 U1, Y1, I3	8.525 U1, Y1			5.80 Y1	\$9.70 U1, Y1	\$8.40 J3, U1, Y1	7.15 U1, Y1
	Granite City, Ill.	4.875 G2	5.95 G2	6.50 G2	6.525 G2								\$8.50 G2	7.25 G2
	Kokomo, Ind.			6.40 C9							5.90 C9			
	Mansfield, Ohio		5.75 E2			6.70 E2								
	Middletown, Ohio		5.75 A7	6.30 A7	6.325 A7	6.70 A7								
	Niles, Warren, Ohio Sharon, Pa.	4.675 S1, R3, N3	5.75 R3	6.30 R3	6.325 N3	6.70 N3	6.90 S1, R3	8.525 S1, R3					\$8.40 R3	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.675 U1, J3, P6	5.75 U1, J3, P6	6.30 U1, J3	6.325 U1		6.90 U1, J3, R3	8.525 U1, J3	9.275 U1		5.80 A5, P6, J3	\$9.70 J3, U1	\$8.40 U1, J3	7.15 U1, J3
	Portsmouth, Ohio	4.675 P7	5.75 P7								5.80 P7			
Weirton, Wheeling, Follanshee, W. Va.	4.675 W3, W5	5.75 W3, W5, F3	6.30 W3, W5		6.70 W3, W5	6.90 W3	8.525 W3				\$9.70 W5, W3	\$8.40 W5, W3	7.15 W5 7.40 W3	
Youngstown, Ohio	4.675 U1, Y1	5.75 Y1		6.325 Y1		6.90 Y1	8.525 Y1			5.80 Y1			7.15 Y1	
WEST	Fontana, Cal.	5.525 K1	7.00 K1				7.75 K1	9.775 K1				\$10.45 K1	\$9.15 K1	
	Geneva, Utah	4.775 C7												
	Kansas City, Mo.										6.05 S2			
	Los Angeles, Torrance, Cal.										6.60 B2			
	Minnequa, Colo.										6.05 C6			
	San Francisco, Niles, Pittsburg, Cal.	5.375 C7	6.70 C7	7.05 C7							6.60 C7	\$10.45 C7	\$9.15 C7	
	Seattle, Wash.													
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	4.675 T2, R3	5.75 T2	6.30 T2, R3							5.80 T2, R3	\$9.80 T2	\$8.50 T2	
	Houston, Tex.										6.05 S2			

IRON AGE

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

STEEL
PRICES(Effective
March 26, 1957)

	BARS						PLATES				WIRE
	Carbon† Steel	Reinforc- ing	Cold Finished	Alloy Hot- rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.			6.125 B3	8.325 B3	7.40 B3					
	Buffalo, N. Y.	5.075 B3,R3	5.075 B3,R3	6.90 B5	6.125 B1,R3	8.325 B5,B3	7.40 B3	4.85 B3			7.20 W6
	Claymont, Del.						5.70 C4		6.85 C4	7.55 C4	
	Coatesville, Pa.						5.25 L4		6.85 L4	7.55 L4	
	Conshohocken, Pa.						4.95 A2	5.925 A2	6.85 A2	7.25 A2	
	Harrisburg, Pa.						5.80 P2	6.275 P2			
	Hartford, Conn.		7.35 R3		8.625 R3	7.40 B3					
	Johnstown, Pa.	5.075 B3	5.075 B3		6.125 B3		4.85 B3		6.85 B3	7.25 B3	7.20 B3
	Fairless, Pa.	5.225 U1	5.225 U1		6.275 U1						
	Newark, N. J.			7.30 W10		8.50 W10					
	Camden, N. J.			7.30 P10		8.50 P10					
	Bridgeport, Conn. Putnam, Conn.	5.30 N8	5.30 N8	7.20 N8 7.40 W10	6.20 N8	8.475 N8	7.50 N8				
	Sparrows Pt., Md.		5.075 B3				4.85 B3		6.85 B3	6.85 B3	7.30 B3
	Palmer, Worcester, Needville, Mass. Milton, Pa.	5.225 M7	5.225 M7	7.40 B5,C14		8.625 A5 8.625 B5					7.50 A5,W6 9.025 T8
	Spring City, Pa.			7.30 K4		8.50 K4					
MIDDLE WEST	Alton, Ill.	5.275 L1									7.40 L1
	Ashland, Newport, Ky.						4.85 A7,A9		6.85 A9		
	Canton, Massillon, Ohio			6.85 R3,R2	6.125 R3,T5	8.325 R3,R2, T5					
	Chicago, Joliet, Ill.	5.075 U1,R3, W8,N4 5.075 P13	5.075 U1,R3, N4 5.075 P13	6.85 A5,B5, W10,L2 W8,N9	6.125 U1,R3, W8	8.325 A5,B5, W8,L2,N9, W10	5.875 W8 7.425 U1	4.85 U1,I3, W8,A1	5.925 U1	6.85 U1,W8	7.25 U1 7.20 A5,K2 R3,N4,W7
	Cleveland, Ohio	5.075 R3	5.075 R3	6.85 A5,C13		8.325 A5,C13	7.425 R3	4.95 J3,R3	5.925 J3		7.25 J3,R3 7.20 A5, C13
	Detroit, Mich.	5.175 G3	5.425 G3	7.05 B5,P8 7.10 P3 6.85 R5	6.225 G3	8.525 B5,P3, P8 8.325 R5	7.525 G3	4.95 G3		6.90 G3	
	Duluth, Minn.										7.20 A5
	Gary, Ind. Harbor, Crawfordsville	5.075 U1,I3, Y1	5.075 U1,I3, Y1	6.85 R3,M5	6.125 U1,I3, Y1	8.325 R3,M4	7.425 U1,I3, Y1	4.85 U1,I3, Y1	5.925 I3	6.85 U1,Y1	7.25 U1,Y1 7.30 M4
	Granite City, Ill.						5.05 G2				
	Kokomo, Ind.										7.30 C9 7.30 K2
	Starling, Ill.	5.175 N4	5.175 N4								
	Niles, Warren, Ohio Sharon, Pa.			6.85 C10	6.125 C10,S1	8.325 C10	7.425 S1	4.85 S1,R3		6.85 S1	7.25 S1,R3
	Pittsburgh, Pa. Midland, Pa.	5.075 U1, C11,J3	5.075 U1,J3	6.85 A5,C8, J3,R3,S9 B4,W10,C11	6.125 U1, C11,J3	8.325 A5,R3, S9,C8,W10, C11	7.425 U1,J3	4.85 U1,J3	5.925 U1	6.85 U1,J3	7.25 U1,J3 7.20 A5,J3, P6
	Portsmouth, Ohio										7.20 P7
	Weirton, Wheeling, Follansbee, W. Va.						4.85 W5				
WEST	Youngstown, Ohio	5.075 U1, Y1,R3	5.075 U1, Y1,R3	6.85 U1,Y1, F2	6.125 U1,Y1	8.325 Y1,F2	7.425 U1,Y1, R3	4.85 U1,Y1, R3		6.85 Y1 7.25 U1	7.25 Y1 7.20 Y1
	Emeryville, Cal.	5.825 J5	5.825 J5								
	Fontana, Cal.	5.775 K1	5.775 K1		7.175 K1		8.125 K1	5.60 K1		7.60 K1	8.00 K1
	Geneva, Utah							4.85 C7			7.25 C7
	Kansas City, Mo.	5.325 S2	5.325 S2		6.375 S2		7.675 S2				7.45 S2
	Los Angeles, Torrance, Cal.	5.775 C7,B2	5.775 C7,B2	8.30 R3,P14	7.175 B2	10.20 P14	8.125 B2				8.15 B2
	Minneapolis, Colo.	5.525 C6	5.525 C6					5.70 C6			7.45 C6
	Portland, Ore.	5.825 O2	5.825 O2								
	San Francisco, Niles, Pittsburg, Cal.	5.775 C7 5.825 B2 6.025 P9	5.775 C7 5.825 B2 6.025 P9				8.175 B2				8.15 C7,C6
	Seattle, Wash.	5.825 B2 N6	5.825 B2				8.175 B2	5.75 B2		7.75 B2	8.15 B2
SOUTH	Atlanta, Ga.	5.575 A8									7.40 A8
	Fairfield, Ala. City, Birmingham, Ala.	5.075 T2,R3 5.325 C16	5.075 T2,R3 5.325 C16	7.45 C16			7.425 T2	4.85 T2,R3		7.25 T2	7.20 T2,R3
	Houston, Ft. Worth, Lone Star, Tex.	5.325 S2	5.325 S2		6.375 S2		7.675 S2	4.95 S2 5.20 L3		6.95 S2	7.35 S2 7.45 S2

† Merchant Quality—Specialty Quality .35¢ higher.

STEEL PRICES

(Effective March 26, 1957)

Key to Steel Producers

With Principal Offices

- A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.
C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metals Products Co., Youngstown, O.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shifting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shifting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa.
D1 Detroit Steel Corp., Detroit
D2 Dearborn Div., Sharon Steel Corp.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.
E1 Eastern Stainless Steel Co., Baltimore
E2 Empire Steel Co., Mansfield, O.
F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzmaurice Steel Corp., Youngstown

- F3 Follanabee Steel Corp., Follanabee, W. Va.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
H1 Hanna Furnace Corp., Detroit
I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland
J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.
K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.
L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.
M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.
O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland
P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit

- P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebbing Sons Co., John A., Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.
S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston
U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham
W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.
Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (per) l.o.b. mills. Base price about \$200 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS							
	1/2 in.		3/4 in.		1 in.		1 1/4 in.		1 1/2 in.		2 in.		2 1/2-3 in.		2 in.		2 1/2 in.		3 in.		3 1/2-4 in.	
	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.
Sparrows Pt. B1	7.25	+8.00	10.25	+4.00	13.75	0.50	16.25	1.25	16.75	2.25	17.25	2.75	18.75	2.50								
Youngstown R3	9.25	+10.00	12.25	+6.00	15.75	+1.50	18.25	0.25	18.75	1.25	19.25	1.75	20.75	2.50								
Fontana K1	+3.75	+23.00	0.75	+19.00	2.75	+14.75	5.25	+13.75	5.75	+11.75	6.25	+11.25	7.75	+10.50								
Pittsburgh J3	9.25	+6.00	12.25	+2.00	15.75	2.50	18.25	3.25	18.75	4.25	19.25	4.75	20.75	5.25	5.25	+20.25	1.25	+16.50	3.75	+13.00	5.25	+11.50
Alton, Ill. L1	7.25	+8.00	10.25	+4.00	13.75	0.50	16.25	1.25	16.75	2.25	17.25	2.75	18.75	2.50								
Sharon M3	9.25	+10.00	12.25	+2.00	15.75	+1.50	18.25	0.25	18.75	1.25	19.25	1.75	20.75	2.50								
Fairless N2	7.25	+8.00	10.25	+4.00	13.75	0.50	16.25	1.25	16.75	2.25	17.25	2.75	18.75	2.50								
Pittsburgh N1	9.25	+6.00	12.25	+2.00	15.75	2.50	18.25	3.25	18.75	4.25	19.25	4.75	20.75	5.25	5.25	+20.25	1.25	+16.50	3.75	+13.00	5.25	+11.50
Wheeling W5	9.25	+6.00	12.25	+2.00	15.75	2.50	18.25	3.25	18.75	4.25	19.25	4.75	20.75	5.25								
Wheatland W4	9.25	+6.00	12.25	+2.00	15.75	2.50	18.25	3.25	18.75	4.25	19.25	4.75	20.75	5.25								
Youngstown Y1	9.25	+6.00	12.25	+2.00	15.75	2.50	18.25	3.25	18.75	4.25	19.25	4.75	20.75	5.25	5.25	+20.25	1.25	+16.50	3.75	+13.00	5.25	+11.50
Indiana Harbor Y1	8.25	+9.00	13.25	+2.00	14.75	1.50	17.25	2.25	17.75	3.25	18.25	3.75	19.75	4.25								
Lorain N2	9.25	+6.00	12.25	+2.00	15.75	2.50	18.25	3.25	18.75	4.25	19.25	4.75	20.75	5.25	5.25	+20.25	1.25	+16.50	3.75	+13.00	5.25	+11.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. B1	11.75	+2.00	15.75	2.00	18.75	6.50	19.25	5.25	19.75	6.25	20.25	6.75	20.75	5.50								
Youngstown R3	13.75	+4.00	17.75	list	20.75	4.50	21.25	4.25	21.75	5.25	22.25	5.75	22.75	5.50								
Fairless N2	11.75	+2.00	15.75	2.00	18.75	6.50	19.25	5.25	19.75	6.25	20.25	6.75	20.75	5.50								
Fontana K1	0.75		4.75		7.75		8.25		8.75		9.25		9.75									
Pittsburgh J3	13.75	+2.00	17.75	4.00	20.75	8.50	21.25	7.25	21.75	8.25	22.25	8.75	22.75	7.50	3.75	+17.75	3.75	+12.00	6.25	+10.50	11.25	+5.50
Alton, Ill. L1	11.75	+2.00	15.75	2.00	18.75	6.50	19.25	5.25	19.75	6.25	20.25	6.75	20.75	5.50								
Sharon M3	13.75	+4.00	17.75	list	20.75	4.50	21.25	4.25	21.75	5.25	22.25	5.75	22.75	5.50								
Pittsburgh N1	13.75	+2.00	17.75	4.00	20.75	8.50	21.25	7.25	21.75	8.25	22.25	8.75	22.75	7.50	3.75	+17.75	3.75	+12.00	6.25	+10.50	11.25	+5.50
Wheeling W5	13.75	+2.00	17.75	4.00	20.75	8.50	21.25	7.25	21.75	8.25	22.25	8.75	22.75	7.50								
Wheatland W4	13.75	+2.00	17.75	4.00	20.75	8.50	21.25	7.25	21.75	8.25	22.25	8.75	22.75	7.50								
Youngstown Y1	13.75	+2.00	17.75	4.00	20.75	8.50	21.25	7.25	21.75	8.25	22.25	8.75	22.75	7.50	3.75	+17.75	3.75	+12.00	6.25	+10.50	11.25	+5.50
Indiana Harbor Y1	12.75	+1.00	16.75	3.00	19.75	7.50	20.25	6.25	20.75	7.25	21.25	7.75	21.75	6.50								
Lorain N2	13.75	+2.00	17.75	4.00	20.75	8.50	21.25	7.25	21.75	8.25	22.25	8.75	22.75	7.50	3.75	+17.75	3.75	+12.00	6.25	+10.50	11.25	+5.50

Threads only, butt weld and seamless 2 1/4 pt. higher discount. Plain ends, butt weld and seamless, 3-in. and under, 5 1/2 pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: 1/2, 3/4 and 1-in., 2 pt.; 1 1/4, 1 1/2 and 2-in., 1 1/2 pt.; 2 1/2 and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2 1/2 and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.50¢ per lb.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	\$1.68	T-1
18	4	1	—	6	2.385	T-4
18	4	2	—	—	1.185	T-2
1.5	4	1.5	8	—	1.04	M-1
6	4	3	6	—	1.43	M-3
6	4	2	6	—	1.185	M-2

High-carbon chromium... .83 D-3, D-5
Oil hardened manganese... .45 O-2
Special carbon... .41 W-1
Extra carbon... .345 W-1
Regular carbon... .29 W-1
Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

Cladding	Plate (A3, J2, L6)			Sheet (J2)
	10 pct	15 pct	20 pct	
302				35.50
304	34.60	38.00	41.50	37.75
316	39.70	43.20	46.65	55.50
321	36.35	39.80	43.50	44.75
347	39.50	43.95	48.45	54.25
405	29.20	33.15	37.05	
410, 430	28.70	32.65	36.55	

CR Strip (S9) Copper, 10 pct, 2 sides, 39.85; 1 side, 39.00.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths) ^a	Cold-Reduced (Coiled or Cut Length)	
		Semi-Processed	Fully Processed
Field.....	9.00	9.20	
Armature.....	10.35	10.35	10.85
Elect.....	11.00	11.025	11.525
Meter.....	12.05	12.075	12.575
Dynamo.....	12.05	12.05	13.55
Trans. 72.....	14.05	14.05	14.55
Trans. 65.....	14.60		
Grain Oriented			
Trans. 58.....	15.10	Trans. 80.....	18.50
Trans. 52.....	16.15	Trans. 73.....	19.00

Producing points: Beech Bottom (W5); Brackenridge (A3); Granite City (G2); Indiana Harbor (I3); Mansfield (E2); Newport, Ky. (N5); Niles, O. (N3); Vandergrift (U1); Warren, O. (R3) (20¢ higher, HR); Zanesville, Butler (A7).

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1957 season. Freight changes for seller's account.

Openhearth lump.....	\$12.70
Old range, bessemer.....	11.85
Old range, nonbessemer.....	11.70
Mesabi, bessemer.....	11.60
Mesabi, nonbessemer.....	11.45
High phosphorus.....	11.45

WAREHOUSES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery Charge	Sheets			Strip	Plates	Shapes	Bars			Alloy Bars		
		Hot-Rolled (18 gage & over)	Cold-Rolled (15 gage)	Galvanized (10 gage)				Hot-Rolled (special quality)	Cold-Finished	Hot-Rolled 4615	Hot-Rolled 4615 As rolled	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		8.17	9.37	9.83	8.21	8.55	8.59	8.45	10.23				
Baltimore	\$.10	7.79	8.99	9.12	8.27	8.12	8.57	8.34	9.09	14.99	14.44	18.39	18.09
Birmingham	.15	7.98	9.08		8.46	8.36	8.85	8.53	9.23				
Boston	.10	7.68	8.88	9.52	7.78	8.01	8.05	8.07	8.44	10.04			
Buffalo	.15	8.00	9.15	10.90	8.20	8.65	8.65	8.40	8.85	8.85	15.65	14.65	19.01
Chicago	.15	7.95	9.15	9.85	7.97	8.31	8.35	8.22	8.44	8.50	15.30	14.30	18.65
Cincinnati	.15	8.09	9.20	9.90	8.29	8.67	8.89	8.53	8.87	8.99	15.61	14.61	18.96
Cleveland	.15	7.93	9.13	9.75	8.07	8.54	8.72	8.31	8.67	8.75	15.39	14.39	18.74
Denver		9.55	11.09	12.41	9.70	9.80	9.60	9.75	10.54				19.79
Detroit	.15	8.18	9.40	10.20	8.32	8.66	8.89	8.52	8.86	8.85	15.46	14.56	18.81
Houston		8.80	9.75		8.85	8.80	9.10	9.15	10.65	15.50		19.30	19.05
Kansas City	.20	8.52	9.72	10.07	8.60	8.83	8.87	8.73	9.42	15.32	14.77	18.72	18.42
Los Angeles	.10	9.20	10.90	11.75	9.25	9.75	9.25	9.15	9.30	12.20	16.45	15.60	20.30
Memphis	.15	8.02	9.22		8.12	8.35	8.39	8.25	9.85				
Milwaukee	.15	8.08	9.28	9.98	8.10	9.75	8.56	8.35	8.71	8.72	15.43	14.43	18.78
New York	.10	8.55	9.76	10.33	9.00	9.11	9.01	9.11	9.48		15.02	14.69	18.42
Norfolk	.20	8.00			8.40	8.35	8.70	8.45	10.70				
Philadelphia	.10	8.25	9.17	10.39	8.92	8.78	8.80	8.81	9.18	9.41	15.61	14.61	18.96
Pittsburgh	.15	7.93	9.14	10.20	8.07	8.31	8.35	8.22	8.59	8.75	15.30	14.30	18.65
Portland		8.90	9.65	11.40	10.25	9.00	9.35	9.45	13.55	16.70	16.10	20.40	20.25
San Francisco	.10	9.05	10.40	10.90	9.05	9.30	9.15	9.15	9.90	12.40	16.45	15.60	20.30
Seattle		9.55	10.70	11.65	9.55	9.30	9.35	9.50	9.85	13.40	16.55	15.85	19.50
Spokane	.15	9.70	10.85	11.80	9.70	9.45	9.50	9.65	10.00	13.55		16.75	20.35
St. Louis	.15	8.29	9.49	10.21	8.34	8.67	8.82	8.58	8.96	9.11	15.66	14.66	19.01
St. Paul	.15	8.29	9.64	10.31	8.39	8.71	8.75	8.52	9.21		14.62		18.27

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

† 16 gage. †† 13 1/2% zinc. ‡ Deduct for country delivery.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nail		Woven Wire Fence		Fence Posts		Rail Ties		Galv. Barbed and Twisted Barbed Wire		March Wire Ann'd		March Wire Galv.	
	Col	Col	Col	Col	Col	Col	Col	Col	Col	Col	Col	Col	Col	Col
Alabama City R3	167	181			195		187	8.10	8.50					
Aliquippa, Pa. J3**	164	179					181	8.20	8.875					
Atlanta A8**	166	182					192	190	8.05	8.65				
Bartonville K2**	166	182					192	190	8.05	8.65				
Buffalo W6										8.20	8.75			
Chicago, Ill. N4**	164	180	167	190	188	7.95	8.55							
Cleveland A6	173						8.20	8.75						
Cleveland A5							8.20							
Crawfordsville M4**	166	182			192	190	8.05	8.65						
Donora, Pa. A5	164	176			196	184	8.20	8.75						
Duluth A5	164	176	167	196	184	8.20	8.75							
Fairfield, Ala. T2	164	176			196	184	8.20	8.75						
Galveston D4	169													
Houston S2	169	181			195	189	8.20	8.60						
Johnstown, Pa. B3**	164	180	167				188	8.20	8.95					
Joliet, Ill. A5	164	176			196	184	8.20	8.75						
Kokomo, Ind. CV*	166	178			192	186	8.05	8.45						
Los Angeles B2**							8.90	9.50						
Kansas City S2*	169	181			195	189	8.20	8.60						
Minneapolis C6*	169	181	172	195	189	8.45	9.00							
Monacaan P6	167	185					191	8.10	8.10					
Palmer, Mass. W6							8.50	9.05						
Pittsburg, Cal. C7	183	199			220	204	9.15	9.70						
Rankin, Pa. A5	164	176					184	8.20	8.75					
So. Chicago R3	167	181			195	187	8.10	8.50						
S. San Francisco C6					214		8.90	9.30						
Sparrows Pt. B3**	166				192	190	8.30	9.05						
Struthers, O. Y1*							7.95	8.45						
Warcester A5	170						8.50	9.05						
Williamsport, Pa. S5			175											

* Zinc less than .10%. † Plus zinc extras.
** 13.5 zinc. ‡ Wholesalers only.
*** .10% zinc.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT				
	0.26	0.41	0.61	0.81	1.06
	0.40	0.60	0.80	1.05	1.35
Baltimore, Md. T8	9.20	10.40	12.60	15.60	18.55
Bristol, Conn. W12		10.40	12.60	15.60	18.55
Boston T8	9.20	10.40	12.60	15.60	18.55
Buffalo, N. Y. R7	8.65	10.10	12.30	15.30	18.25
Carnegie, Pa. S9	8.65	10.10	12.30	15.30	
Cleveland A5	8.65	10.10	12.30	15.30	18.25
Detroit D1	8.75	10.20	12.40	15.40	
Detroit D2	8.75	10.20	12.40		
Dover, O. G4	8.65	10.10	12.30	15.30	18.25
Franklin Park, Ill. T8	8.75	10.10	12.30	15.30	18.25
Harrison, N. J. C11		12.30	15.30		18.25
Indianapolis C5	8.10	9.95	12.60	15.60	17.95
Los Angeles	10.85	12.30	14.50		
New Castle, Pa. B4	8.65	10.10	12.30	15.30	
New Haven, Conn. D1	9.10	10.40	12.60	15.60	
Pawtucket, R. I. N7	9.20	10.40	12.60	15.60	18.55
Pittsburgh S7	8.65	10.10	12.30	15.30	18.25
Riverdale, Ill. A1	8.75	10.10	12.30	15.30	18.25
Sharon, Pa. S1	8.65	10.10	12.30	15.30	18.25
Trenton R4	11.05	10.40	12.60	15.60	18.55
Wallingford W1	9.10	10.40	12.60	15.60	18.45
Warren, Ohio T4	8.65	10.10	12.30	15.30	18.25
Worcester, Mass. A5	9.20	10.40	12.60	15.60	18.55
Youngstown C5	7.95	9.80	12.60	15.00	17.95

BOILER TUBES

\$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size		Seamless		Elec. Weld	
	OD-In.	B.W.-Ga.	H.R.	C.D.	H.R.	C.D.
Babcock & Wilcox	2	13	36.34	42.56	33.21	
	2 1/2	12	48.94	57.31	44.73	
	3	12	56.51	66.18	51.66	
	3 1/2	11	65.97	77.25	60.30	
	4	10	87.61	102.59	80.07	
National Tube	2	13	36.34	42.56	33.21	
	2 1/2	12	48.94	57.31	44.73	
	3	12	56.51	66.18	51.66	
	3 1/2	11	65.97	77.25	60.30	
	4	10	87.61	102.59	80.07	
Pittsburgh Steel	2	13	36.34	42.56		
	2 1/2	12	48.94	57.31		
	3	12	56.51	66.18		
	3 1/2	11	65.97	77.25		
	4	10	87.61	102.59		

(Effective March 26, 1957)

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Balls Unbraced
Bessemer U1	5.275	6.25	6.60				
So. Chicago R3				9.225			
Ensley T2	5.275	6.25					
Fairfield T2		6.25		9.225		6.275	
Gary U1	5.275					6.275	
Huntington I3	5.275	6.25					
Ind. Harbor Y1	5.275		6.60	9.225		6.275	
Ind. Harbor Y1				8.775			
Johnstown B3		6.25					
Joint U1			6.60				
Kansas City S2				9.225			13.85
Lakawanna B3	5.275	6.25	6.60			6.275	
Lohannon B1							13.85
Minneapolis C6	5.275	6.75	6.60	9.225		6.275	13.85
Pittsburgh P3				8.775	12.85		
Pittsburgh J3				9.225			
Seattle B2				9.225		6.425	13.16
Steelton B3	5.275		6.60			6.275	13.85
Struthers Y1				8.775			
Torrance C7						6.425	
Williamport S5	6.15						
Youngstown R3				9.225			

COKE

Furnace, beehive (f.o.b. oven) Net-Ton
Connellsville, Pa. \$15.00 to \$15.75
Foundry, beehive (f.o.b. oven)

Foundry oven coke	\$17.50 to \$19.00
Buffalo, del'd	\$31.75
Detroit, f.o.b.	30.50
New England, del'd	31.55
Kearney, N. J., f.o.b.	29.75
Philadelphia, f.o.b.	29.50
Swedeland, Pa., f.o.b.	29.50
Painesville, Ohio, f.o.b.	30.50
Erie, Pa., f.o.b.	30.50
Cleveland, del'd	32.55
Cincinnati, del'd	31.84
St. Paul, f.o.b.	29.75
St. Louis, f.o.b.	31.50
Birmingham, f.o.b.	28.85
Milwaukee, f.o.b.	36.50
Neville, In., Pa.	29.25

ELECTRODES

Cents per lb f.o.b. plant, threaded, with
nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (in.)	Length (in.)	Price	Diam. (in.)	Length (in.)	Price
24	84	24.75	48	100, 110	10.70
20	72	24.00	35	110	10.70
16 to 18	72	24.50	30	110	10.85
14	72	25.00	24	72 to 84	11.25
12	72	25.50	20	90	11.00
18	60	26.50	17	72	11.40
16	48	27.00	14	72	11.85
7	60	26.75	12	60	12.95
6	60	30.00	10	60	13.90
4	40	33.25	8	60	13.30
3	40	35.25			
2 1/2	30	37.25			
2	24	57.75			

* Prices shown cover carbon nipples.

ELECTROPLATING SUPPLIES**Anodes**

(Cents per lb, frt allowed in quantity)	
Copper	
Cast elliptical, 18 in. or longer, 5000 lb lots	49.42
Electrodeposited	39.25
Brass, 80-20, ball anodes, 2000 lb or more	50.00
Zinc, ball anodes, 2000 lb lots	21.25
(for elliptical add 2¢ per lb)	
Nickel, 99 pct plus, rolled carbon, 5000 lb	\$1.0225
(Rolled depolarized add 3¢ per lb)	
Cadmium	\$1.70
Tin, ball anodes and elliptical \$1.07 per in.	

Chemicals

(Cents per lb, f.o.b. shipping point)	
Copper cyanide, 100 lb drum	76.00
Copper sulphate, 100 lb bags, per cwt.	24.35
Nickel salts, single, 100 lb bags	40.50
Nickel chloride, freight allowed, 300 lb	45.50
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums	23.05
(Philadelphia price 23.30)	
Zinc cyanide, 100 to 500 lb	55.55
Potassium cyanide, 100 lb drum N. Y.	48.00
Chromic acid, flake-type, 1 to 20 100-499 lb drums	31.75

BOLTS, NUTS, RIVETS, SCREWS(Base discount, f.o.b. mill)
Pot Discounts

Machine and Carriage Bolts	Full Con- tainer Price	30 Con- tainers	20,000 Lb.	40,000 Lb.
1/2" and smaller x 6"	52 1/2	50 1/2	58 1/2	59 1/2
and shorter				
1/4" thru 1 1/2" longer than 6"	43 1/2	47 1/2	50	51 1/2
Rolled thread carriage bolts 1/2 in. & smaller	52 1/2	50 1/2	58 1/2	59 1/2
x 6 in. and shorter				
Lag, all diam. x 6"	52 1/2	50	58	59
and shorter				
Lag, all diam. longer than 6 in.	44 1/2	48	50	51
Flow bolts, 1/2" and smaller x 6" and shorter	52	55 1/2	57	58

(Add 25 pct for broken case quantities)

Nuts, Hex, HP reg. & hvy.	Full Case or Keg Price
3/4 in. or smaller	61 1/2
3/8 in. to 1 in. inclusive	57 1/2
1 1/8 in. to 1 1/2 in. inclusive	62 1/2
1 1/2 in. and larger	56

C. P. Hex reg. & hvy.

3/4 in. and smaller	61 1/2
3/8 in. to 1 1/2 in. inclusive	57 1/2
1 1/8 in. and larger	56

Hot Galv. Nuts (All Types)

3/4 in. and smaller	48
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Semi-finished Hex Nuts

3/4 in. or smaller	61 1/2
3/8 in. to 1 1/2 in. inclusive	57 1/2
1 1/8 in. and larger	56
(Add 25 pct for broken case or keg quantities)	

Finished

1 in. and smaller	64
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Rivets

	Base per 100 lb
1/2 in. and larger	\$11.50
	Pot Off List
7/16 in. and smaller	23

Cap ScrewsDiscount (Packages)
Bright Treated H. C. Heat

New std. hex head, pack- aged		
1/2" diam. and smaller x 6" and shorter	44	31
3/8" 3/4" and 1" diam. x 6" and shorter	27	9
5/8" diam. and smaller x longer than 6" diam.	14	+ 6
3/4" 3/8" and 1" diam. & longer than 6" diam.	1/2 + 24	

C-1018 Steel
Full-Finished
Cartons Bulk

1/4" through 3/4" dia. x 6"	44	61
and shorter		
3/4" through 1" dia. x 6"	27	49
and shorter		
Minimum quantity—1/4" through 3/4" diam., 15,000 pieces; 1/16" through 3/4" diam., 5,000 pieces; 3/4" through 1" diam., 2,000 pieces.		

Machine Screws & Stove Bolts

	Discount	Machine Screws	Stove Bolts
Plain Finish			
Cartons	10	23	
Bulk			
To 1/4" diam. incl.	25,000-200,000	9	54
5/16 to 3/4" diam. incl.	15,000-100,000	9	54
All diam. over 3/4" long	5,000-100,000	—	54

Machine Screw & Stove Bolt Nuts

	Discount	Hex	Square
In cartons	16	19	
	Quantity		
In Bulk			
3/4" diam. & smaller	15,000-100,000	7	9

CAST IRON WATER PIPE INDEX

Birmingham	119.0
New York	131.7
Chicago	124.1
San Francisco-L. A.	141.8
Dec. 1955 value, Class B or heavier 6 in. or larger, bell and spigot pipe. Ex- planation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.	

REFRACTORIES**Fire Clay Brick**

	Carloads per 1000
First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add \$5.00)	\$128.00
No. 1 Ohio	128.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	114.00
No. 2 Ohio	98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add \$2.00)	30.00

Silica Brick

Mt. Union, Pa., Ensley, Ala.	\$140.00
Childs, Hays, Pa.	148.00
Chicago District	150.00
Western Utah	144.00-165.00
California	170.00
Super Duty	
Hays, Pa., Athens, Tex., Wind- ham, Warren, O., Morrisville	150.00-157.00

Silica cement, net ton, bulk, Latrobe	26.50
Silica cement, net ton, bulk, Chi- cago	24.00
Silica cement, net ton, bulk, Ens- ley, Ala.	26.50
Silica cement, net ton, bulk, Mt. Union	23.00
Silica cement, net ton, bulk, Utah and Calif.	35.00

Chrome Brick

	Per net ton
Standard chemically bonded, Balt.	\$98.00
Standards chemically bonded, Curt- ner, Calif.	108.00
Burned, Balt.	92.00

Magnesite Brick

Standard, Baltimore	\$121.00
Chemically bonded, Baltimore	109.00

Grain Magnesite

St. 1/4 to 3/4-in. grains	
Domestic, f.o.b. Baltimore in bulk	\$69.40
Domestic, f.o.b. Chewelah, Wash., Luning, Nev.	
In bulk	43.00
In sacks	49.00

Dead Burned Dolomite

	Per net ton
F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	\$16.00
Midwest	15.32
Missouri Valley	15.00

METAL POWDERSPer pound, f.o.b. shipping point, in ton
lots, for minus 100 mesh

Swedish sponge iron f.o.b. Riverton, N. J., ocean bags	8.50¢
Canadian sponge iron, del'd in East, carloads	9.5¢
Domestic sponge iron, 98+% Fe, carload lots	8.5¢
Electrolytic iron, annealed, imported 99.5+ % Fe	27.5¢
domestic 99.5+ % Fe	36.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+ % Fe	57.0¢
Electrolytic iron melting stock, 99.84% pure	23.0¢
Carbonyl iron size 5 to 10 micron, 98%, 99.8+ % Fe	86.0¢ to \$1.55
Aluminum, freight allowed	38.00¢
Brass, 10 ton lots	37.50¢ to 50.00¢
Copper, electrolytic	43.75¢
Copper, reduced	49.75¢
Cadmium, 100-199 lb, 95% plus metal value	
Chromium, electrolytic, 99.85% min. Fe .03 max. del'd	\$5.00
Lead	8.90¢ plus metal value
Manganese f.o.b. Exton, Pa.	46.0¢
Molybdenum, 99%	\$3.60 to \$3.55
Nickel, unannealed	\$1.00
Nickel, annealed	\$1.00
Nickel, spherical, unannealed	
#80	\$1.13
Silicon	43.50¢
Solder powder, 7.0¢ to 9.0¢ plus metal value	
Stainless steel, 302	99.0¢
Stainless steel, 316	\$1.22
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	\$4.20
Zinc, 10 ton lots	18.75¢ to 32.50¢

THE IRON AGE, March 28, 1957



RITCO FORGINGS

**simplify product designing...
send parts cost down!**

Whether you're planning a new product . . . or redesigning an older one . . . it will pay you to consider the many economy and design features of Ritco "Bright Finish" Forgings.

THEY'RE STRONGER! The dense, fibrous structure and controlled grain flow of Ritco Forgings provide maximum strength and toughness at points of greatest shock and stress . . . improve impact resistance and fatigue strength in parts.

... CLEANER! Ritco Forgings are free of flash, voids and blow holes . . . smoothed to a bright flawless finish.

... MORE ECONOMICAL! Because they are held to extremely close tolerances, Ritco Forgings require minimum machining . . . save hours of time and labor . . . keep your production costs *down*. Depending on design requirements, Ritco Forgings can be produced in weights from 1/4 to 15 lbs. in a wide range of metals and alloys.

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We also offer complete machining facilities and make Special Fasteners and Upsets. Send us your requirements!

Exclusive New England representative
for Cleveland Cap Screw Company.

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144 WEST RIVER STREET

PROVIDENCE 1, R. I.

THE IRON AGE, March 28, 1957

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SINCE 1892

It means much to critical buyers:

- metallurgical quality control
- close-limit precision-production
- fast shipments direct from plant
- district warehouse distributors



Cut costs by ordering exact shapes needed — drawn to the exceptionally close tolerances that have made **MOLTRUP** the quality name in steel for over 65 years. All standard shapes — any special shape . . . carbon — alloy — leaded steels . . . close-tolerance key stock.

Moltrup products include turned and polished shafting . . . free cutting screw stock . . . machine rack . . . all types of machine keys and pins . . . polished steel plates . . . foundry pattern, core and bottom plates.

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Try us for emergency needs.*

Phone: Beaver Falls 730

(Consult telephone directory in cities listed)

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 BEAVER FALLS, PA.

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Detroit, Mich.	New York, N. Y.	Syracuse, N. Y.	Cincinnati, O.
Cleveland, O.	Los Angeles, Calif.		

FERROALLOY PRICES

(Effective March 26, 1957)

Ferrochrome

Contract prices, cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, 30-39% max. Si.			
0.025% C	41.50	0.20% C	38.50
0.03% C	41.00	0.50% C	38.25
0.06% C	39.50	1.00% C	37.50
0.10% C	39.00	1.50% C	37.35
0.15% C	38.75	2.00% C	37.25
4.00-4.50% C, 67.70% Cr, 1-2% Si	27.75		
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si	27.75		
0.025% C (Simplex)	34.75		
0.10% C, 50-52% Cr, 2% max. Si	35.50		
8.50% max. C, 50-55% Cr, 3-6% Si	24.00		
8.50% C, 50-55% Cr, 3% max. Si	24.00		

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max 0.10% C price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.	
0.10% max. C	\$1.31
0.50% max. C	1.31
9 to 11% C, 88-94% Cr, 0.75% Fe	1.40

Electrolytic Chromium Metal

Contract prices per lb of metal 2" x 1/4 plate (1/8" thick) delivered packed, 99.80% min. Cr, (Metallic Base) Fe 0.20 max.	
Carloads	\$1.29
Ton lots	1.31
Less ton lots	1.33

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.)	
Contract price, carloads, delivered, lump, 8-in. x down, per lb of Cr, packed.	
Carloads	44.65
Ton lots	48.95
Less ton lots	51.45

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed.	
30-35% Cr, 60-65% Si, 3.00 max. Fe.	
Carloads	25.65
Ton lots	27.95
Less ton lots	29.45

Calcium-Manganese-Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed.	
16-20% Ca, 14-18% Mn, 53-59% Si.	
Carloads	24.25
Ton lots	26.15
Less ton lots	27.15

5M2

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe 1/2 in. x 12 mesh.	
Ton lots	20.15
Less ton lots	21.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.	
Carload lots	17.20
Ton lots	18.70
Less ton lots	19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.	
Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	
Marietta, Ashabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	12.75
Johnstown, Pa.	12.75
Sheridan, Pa.	12.75
Philo, Ohio	12.75
B. Duquesne	12.75
Add or subtract 0.1¢ for each 1 pct Mn above or below base content.	
Briquets, delivered, 66 pct Mn:	
Carloads, bulk	14.80
Ton lots packed	17.20

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.	
Manganese Silicon	
16 to 19%	3% max. \$100.50
19 to 21%	3% max. 102.50
21 to 23%	3% max. 105.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.	
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.	
Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.	
Carloads	33.00
Ton lots	35.00
250 to 1999 lb	37.00
Premium for Hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn	
	25.50

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.			
Carloads		Ton	Less
0.07% max. C, 0.06% P, 90% mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	33.60	36.40	37.40
0.30% max. C	32.10	34.90	36.10
0.50% max. C	31.60	34.40	35.60
0.75% max. C, 80.85% Mn, 5.0-7.0% Si	28.60	31.40	32.60

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.	
Carloads bulk	12.80
Ton lots	14.45
Briquet contract basis carloads, bulk, delivered, per lb of briquet	14.10
Ton lots, packed	16.50

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wapakoneta, Wash., \$100.00 gross ton, freight allowed to normal trade area.	
Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$93.00.	

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.		
	Ton lots	Carloads, packed
96.75% Si, 1.25% Fe	23.70	22.40
98% Si, 0.75% Fe	24.45	23.15

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.	
Carloads, bulk	7.70
Ton lots, packed	10.50

Electric Ferrosilicon

Contract prices, cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.			
50% Si	13.00	75% Si	16.80
65% Si	15.65	85% Si	18.50
	90% Si		19.90

Ferrovanadium

50-55% V contract, basis, delivered, per pound, contained V, carloads, packed.	
Openhearth	3.30
Crucible	3.30
High speed steel (Primos)	3.40

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.			
	Ton lots	Cast Turnings	Distilled
	\$2.05	\$2.95	\$3.75
	2.40	3.30	4.55

Alsiifer, 20% Al, 40% Si, 40% Fe.

Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.	
Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6%

f.o.b. Langloeth, Pa., per pound Contained Mo	\$1.28
---	--------

Ferrocolumbium, 50-50%, 2 in.

x D contract basis, delivered per pound contained Cb.	
Ton lots	\$6.90
Less ton lots	6.95

Ferro-tantalum-columbium, 20%

Ta, 40% Cb, 30% C, contract basis, del'd ton lots, 2-in. x D per lb cont'd Sb plus Ta	
	\$4.95

Ferronomolybdenum, 55-75%, 200-lb

containers, f.o.b. Langloeth Pa., per pound contained Mo	\$1.68
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Ferrophosphorus, electric, 23-

26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$4.00 unitage, per gross ton	
10 tons to less carload	\$90.00
	\$110.00

Ferrotitanium, 40% regular grade

0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb, contained Ti	
	\$1.35

Ferrotitanium, 25% low carbon,

0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti	
	\$1.50
Less ton lots	\$1.55

Ferrotitanium, 15 to 18% high

carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton	
	\$215.00

Ferrotungsten, 1/2 x down,

packed, per pounds contained W, ton lots delivered	\$3.15
--	--------

Molybdenum oxide, briquets, per lb

contained Mo, f.o.b. Langloeth, Pa., f.o.b. Washington, Pa., Langloeth, Pa.	
	\$1.41
	\$1.33

Simanal, 20% Si, 20% Mn, 20%

Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb.	
Carload, bulk lump	18.50¢
Ton lots, packed lump	20.50¢
Less ton lots	21.00¢

Vanadium oxide, 86-89% V₂O₅

contract, basis, per pound contained V ₂ O ₅	\$1.38
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Zirconium contract basis, per lb

of alloy	
35-40% f.o.b. freight allowed, carloads, packed	27.25¢
12-15%, del'd lump, bulk-carloads	9.25¢

Boron Agents

Borasil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B	
2000 lb carload	\$6.50

Bortam, f.o.b. Niagara Falls,

Ton lots per pound	
Less ton lots, per pound	45¢
	50¢

Corbortam, Ti 15-21%, B 1-2%,

Si 2-4%, Al 1-2%, C 4-6-7.5% f.o.b., Suspension Bridge, N. Y., freight allowed.	
Ton lots per pound	14.00¢

Ferroboreon, 17.50 min. B, 1.50%

max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots	
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up	
10 to 14% B	.85
14 to 19% B	1.20
19% min. B	1.60

Gratani, f.o.b. Bridgeville, Pa.,

freight allowed, 100 lb and over	
No. 1	\$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn,

15.20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.	
Ton lots	\$1.48
Less ton lots	1.57

Nickel-Boron, 15-18% B, 1.00%

max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots	
	\$2.15

WILLIAMS-WHITE Hydraulic Gap Frame Presses

With Adjustable Pressure and Stroke



- Capacity 100 Tons
- Daylight 30"
- Table, R-L, F-B 96"x54"
- Stroke 18"

This WILLIAMS-WHITE Hydraulic Gap Frame Press is of steel plate, welded construction with integral table. Furnished with sensitive hand lever control which is spring-centered to return ram to neutral position. A latch is also provided for holding pressure. Press has two double acting kicker pistons for rapid approach and return speeds. Gap Frame Presses can be built in capacities from 15 tons.

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Position covers complete modern strip mill producing and finishing the highest quality steels and related metals. Pittsburgh district.

Interviews will be given only to qualified persons. Our supervisors know this opening exists. In reply, please provide personal data, work history and educational background. All replies held in confidence. Salary open.

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MACLEOD offers complete designing, fabrication, and installation of abrasive blast cleaning rooms, abrasive reclaiming systems, blast generators, and dust collecting systems—designed to meet your specific needs.

The room installation illustrated was custom-built by MACLEOD for the renovation of various types of military vehicles. It is served by a continuous, automatic blast generator, abrasive reclaiming and cleaning system, and a dust collecting system with a 54,000 cu. ft. per minute capacity. The floor is stressed to support vehicles up to 45 tons. Write for descriptive literature on MACLEOD Blast Cleaning Rooms, Cabinets and Machines.

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60th
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YEAR

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SPECIAL OFFERING 50-TON CAPACITY GONDOLA CARS

Length—46'0" Drop Ends
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or STEEL"

THE CLEARING HOUSE

Pittsburgh Market Is Spotty

Used machinery dealers there have different opinions on the state of business.

Some find market strong, others see it weak. Optimists win by small margin.

■ The used machinery business is moving up, down, and sideways in a spotty Pittsburgh market.

One dealer reports a marked pickup in machine tool sales in the last month. Another says orders for electrical equipment are off 20-25 pct in the past two weeks. A third says sales of steel mill equipment are holding at a high level.

Who's Right?—Even on the same types of machinery, dealers disagree. One crane specialist finds things quiet. Another reports a spurt in activity. There is a similar split on electrical motors and generators.

Summing it all up, the optimistic reports outweigh the pessimistic, but only by a slight margin. There is no clear-cut trend.

On the plus side, machine tool inquiries are up and yielding more results. After a two-month period of holding back, buyers are now following up inquiries with orders. Lathes and vertical milling machines are in good demand. A number of new machine shops are being set up, after almost a year of little growth of this type. There's a general awakening of the tool market.

Money Talks—The price squeeze is tighter than ever, according to one tool dealer. No one wants to part with recent equipment and

plants will hang on to machines rather than sell them for less than the top price.

Tool buyers are equally cash conscious. When they make a purchase, they are looking to trade off old equipment as part of the deal. This is true of large as well as small companies.

A second machine tool dealer agrees that sales are up but feels that the supply picture has improved. He says more tools are being offered, and finds prices holding fairly steady.

Dead Phone—In sharp contrast with this optimism, a supplier of motors and generators says the phone has almost stopped ringing in the past two weeks. He feels plants are cutting stocks to the bone. He says they are spending only when they have to and then want rush delivery. A second electrical man is more cheerful. He reports orders and inquiries are holding up, that demand for large motors continues strong.

Steel mill equipment continues to move at a brisk rate with export, nonferrous, and special metals markets leading the way. Recent Latin American orders include two bar mills with a full complement of speed reducers, straighteners and other auxiliary items. Orders for small flat-rolling mills are coming from auxiliary places, as more companies seem to be working with special metals.

Keep Looking—Crane inquiries are lagging, according to one dealer, and many of the calls show little active buying interest. Plants are seeking general information, not filling specific needs.

CONSIDER GOOD USED EQUIPMENT FIRST

BENDING ROLLS
 6" 3/16" Niagara Initial Type
 10" 1/2" Kline Pyramid Type
 30" x 1/2" Niles Pyramid Type

BRACKS—LEAF TYPE
 8" 3/16" Dreis & Krump
 12" x 1/2" Dreis & Krump

BRACKS—PRESS TYPE
 12" x 5/16" Cincinnati—NEW

CRANES—OVERHEAD ELECTRIC TRAVELING
 3 ton P&H 56" Span 220/3/60
 5 ton R&M 49" Span 220/3/60 A.C.
 Floor Control—New 1955

5 ton Whiting 48" Span 230/3/60 A.C.
 5 ton Shaw 56" Span 230 Volt D.C.
 8 ton P&H 55" Span 230/3/60
 10 ton P&H 38" Span 230 Volt D.C.
 10 ton R&M 40" Span 220/3/60 A.C.
 15 ton P&H 48" Span 220 Volt D.C.
 25 ton Cleveland 70" Span 230/3/60 A.C.
 With 10 ton Auxiliary

DRAW BENCH
 10,000# Aetna Standard. Length of Draw 44". Used to draw S.A.E. 1035 Welded Steel Tubing

FORGING MACHINES
 1" to 5" Acme, Ajax, National
 1" Acme Model XX, Air Clutch, NEW 1954

HAMMERS—BROAD DROP—STEAM DROP—STEAM
 FORGING—800 lb to 20,000 lb.

LEVELER—STRETCHER
 100 ton Hydr. Stretcher Leveler. Capy. .032" Ga.
 36" Width, 96" Length; 4 sheets in a Park

LEVELERS—ROLLER
 37" Torrington, 19 Rolls 1-31/32" Dia. Backed up
 48" Aetna Standard, 17 Rolls 3/4" Dia.

54" McKay, 17 Rolls, 3/4" Dia.
 108" American, 17 Rolls, 3/4" Dia.

PLANER—PLATE EDGE
 35" Southwark Pneumatic Holddown, Motor Driven, Capacity 1 1/2"

PRESSES—HYDRAULIC
 200 ton Bliss Hydro Dynamic, 36" Stroke Bed Area 30" x 31"
 2800 ton Bliss Hydro Dynamic, 12" Stroke, 60-15/16" Between Columns
 4500 Baldwin-Lima-Hamilton Hydr. Forging Press

PRESSES—STRAIGHT SIDE
 Bliss #8C 300 ton, 16" Stroke, Bed 44" x 83"
 Clearing F-1300-42, 300 ton, 24" Stroke, Bed 44 x 36"
 Bliss #1018 Toggle Drawing 1550 ton, Inner Stroke 24", Outer 12", Die Space 60" x 72"

PRESSES—TRIMMING
 #56 Bliss Cons., 5" Stroke, 26" Ret. Up
 #73 1/2" Bliss 3" Stroke, 18" Ret. Up
 #76 1/2" Bliss 4" Stroke, 27" Ret. Up

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 22" x 40" Three High Sheet Mill
 Torrington Wire Flattening Mill Rolls 6" dia. x 5" Face

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 No. 4 Mesta RH LK, Capacity 2" x 12"

SHEAR—BAR
 No. 12 Buffalo Armor Plate
 Capacity 5" to 13" Beams & Channels

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 62" x 1/2" Peck Stow & Wilcox
 8" x 1/2" Niagara—NEW 1952
 10" x 1/2" Niagara—NEW 1950
 12" x 1/2" Cincinnati

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 25" Blake & Johnson
 36" Wyan Slitting Line
 36" Paxson Slitting Line

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 Die Length Hydraulic Feed, LATE

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SLIP RING MOTORS

Constant Duty—3 phase, 60 cycle

Qu.	H.P.	Make	Type	Volts	R.P.M.
1	1000	Whase.	CW	2300	800
1	700	Whase.	CW	2300	800
9	500	Al. Ch.	ARY	2300	505
1	500	G.E.	I-M	2300	450
1	400	Al. Ch.	ARY	2300	505
1	400	Whase.	CW	2300	390
1	350	G.E.	MT-412	2300	450
3	300	Whase.	CW	2300	1200
1	300	Whase.	CW	2300	720
1	250	Al. Ch.	ARY	440	705
1	250	Whase.	CW-1100	2300	485
1	250	G.E.	MT-414	2300	300
1	200	G.E.	I-M	2300	1700
2	200	G.E.	I-17-M	2300	585
1	200	G.E.	I-14-M	2300	490
1	150	Al. Ch.	ARY	440/220	720
1	150	Whase.	CW	4100/2300	585
1	150	Whase.	CW-1000	440	435
1	100	Whase.	CW	410/220	1160
1	100	Ed. Dy.	EDX-612	2300	900
2	100	G.E.	MT-562	440/220	570
2	100	G.E.	I-15A-M	2300	495
1	100	Al. Ch.	ARY	440	430

SYNCHRONOUS MOTORS

3 Phase, 60 Cycle

Qu.	H.P.	Make	P.F.	Volts	R.P.M.
1	2000	Whase.	90	2200	180
1	1750	G.E.	100	2200	3600
1	1500	Whase.	80	2300	514
1	920	G.E.	80	2200/440	300
1	710	G.E.	80	2300	720
1	450	Whase.	100	2200	128.5
9	350	G.E.	100	2300	900
1	300	G.E.	100	2300	720
1	300	G.E.	80	2200	600
2	250	Whase.	80	440	400
1	250	Whase.	80	440	600
1	200	Al. Ch.	100	2200	514
1	200	Al. Ch.	100	2300	360
1	150	G.E.	100	2200	960
1	150	Ed. Mech	80	220	720
1	150	G.E.	100	550	600
3	135	G.E.	80	4000/2200	1200
1	125	G.E.	80	2200	300
3	100	Whase.	80	440/220	1800
1	100	Ideal	80	440/220	900
2	100	G.E.	80	440/220	800
1	100	Ed. Mech	100	440/220	360
3	50	G.E.	80	2200	600

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A. C. MOTORS

3 phase—60 cycle

SLIP RING

Qu.	H.P.	Make	Type	Volts	Speed
2	1750	G.E.	M-579BS	4800	1800
1	1500	G.E.	MT	6600	1187
1	1100	F.M.	GVZK, B.B.	4800	1800
1	800	G.E.	MT	2300	283
1	750	G.E.	MT-573	2300	1190
1	700	A.C.		2300	500
1	500	Whase.	CW	550	350
1	400	Whase.	CW	440	514
1	350	Cr. Wh.	Size 71	208/416	1765
1	350	G.E.	IM-17A	440/2200	720
1	250	G.E.	KT-42Y	4000	257
1	250	Cr. Wh.	Size 290	2300	350
1	200	G.E.	IE13 B-M	220/440	1760
1	200	G.E.	MT-557Y	220/440	1760
1	200	Cr. Wh.	200JB	440	505
1	200	G.E.	IM	440	435
3	200	G.E.	I-17AM	2200	435
1	200	G.E.	IM	2200	580
1	150 (unused) Whase.	CW		435	400
1	125	A.C.		440	865
1	125	Al. Ch.	IM-16	440	720
1	100	G.E.	IM	440	800
4	100	A.C.	ANY	440	695

SQUIRREL CAGE

1	800	G.E.	KT-573	2200	1180
1	650	G.E.	PT-550HB	440	3570
3	500	Whase.	CS-1216	2200	500
2	450	Whase.	CS-1420	2300/4150	354
1	400	G.E.	IK	2200	500
1	300	G.E.	KT-559A	2200	1775
1	200	G.E.	IK-17	440	580
2	200	G.E.	KT-557	440	1800
1	150/75	G.E.	IK	410/900/450	
1	150	Whase.	CS-8568	640	880
1	150	Whase.	CS	440	580

SYNCHRONOUS

Qu.	H.P.	Make	Types	Volts	RPM
1	7000	G.E.	ATI	2200/6600	600
1	4350	C.W.	3501SL	4000/6900/13800	514
1	2850	Whase.	Sp.F.	2300/1600	514
1	2800	Whase.	Sp.F.	2300	720
1	2000	Whase.		2300	120
2	1750	G.E.	ATI	2300	3600
1	735	G.E.	ATI	2200/12000	600
1	450	Whase.	ATI	2200	128.5
1	325	G.E.	ATI	440	1800
1	225	G.E.	ATI	440	1800
1	100	G.E.	TS-7556	220/440	900

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 No. 74 Head hyd. pl. Internal X-sliding H. S., 1941.
 16" x 36" Landis type C hyd. pl. cylindrical, 1942.

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 No. 6-1 Nazel, pneumatic, late.
 No. 6B Nazel, self-contained.

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No. 3 Gisholt Univ. Turret Lathes (2), 1942.
 No. 5 Gisholt ram type Univ. Turret Lathes, 1940.
 15" x 30" Lipe Carbo-Matic, 1942.
 126" x 90" CC Niles Bement Pond engine lathe, 90
 H.P. M.D.

MILLING MACHINES

No. 2 Brown & Sharpe vertical mill, new 1943.
 No. 5-48 Cincinnati hydromatic duplex mill, serial
 3B51D1K-5.
 No. 2-24 Cincinnati automatic simplex mill, serial
 No. 1B3PIT-1.
 No. 3 Milwaukee vertical mill, PRT

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200 ton No. 7-72 Bliss S.S. D.C. Press Air Clutch.
 350 ton Elmes self-cont. 4-post Hydraulic Press, 1944.
 500 ton No. 1039 Hamilton D.C. adj. bed. 60" x 102".
 800 ton Model 2E-48-800 Hamilton, S.S. airclutch,
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 2000 ton No. 6 National Maxipress Forging Press.

SHAPERS & SLOTTERS

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UPSETTERS

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 3" Ajax upsetting & forging machine, air clutch,
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 3" National high duty forging machine, serial 14195.
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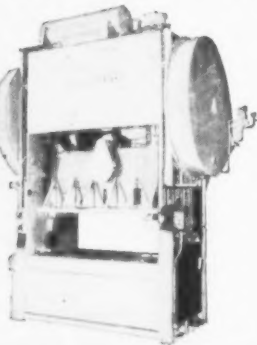
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6" 10 ga. Wysong & Miles Squaring Shear, MD, AC, Late
10" 18 ga. Niagara Squaring Shear, MD, AC
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Pels Single End Punch, 3/4" thru 1" cap, 36" throat, MD
1 1/2" Buffalo Ironworker, Notcher
1 1/2" Buffalo Struct. Ironworker, Coper & Notcher, 1955
27 King Ironworker, Coper & Notcher, 1954
27 King Universal Beam Punch, Cap 24" 1 Beams

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20" x 102" American Paemaker, Late
18-22" x 96" Monarch TA, Late
25 Cincinnati Plate Mill, Late
23 Warner & Swasey, Press, BF & Chucker, Late
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24"x12" bed American, m.d.
24"x12" bed LeBlond Geared Head, m.d., taper
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24" raised to swing 32"x22" bed—16' centers—
New Haven, cone, taper
25" actual swing 25"x10" centers New Haven
Loose Change, belt drive
24", 51 1/4" Lodge & Shipley Lathe, m.d.
25"x10" bed LeBlond Geared Head, m.d., taper
25"x10" centers LeBlond Heavy Duty G.H., m.d.
30"x12'6" bed Niles-Bement-Pond variable
speed motor drive, taper
36"x132" Sidney, m.d., latest
42"x14" bed American Geared Head, m.d.
42" Pulham raised to swing 56"x20" bed
Geared Head, m.d., 11'8" centers

MANUFACTURING LATHES

12"x33", 20"x25", Jones & Lamson Fay Auto-
matic Lathes, 1946
12"x18" Reid Small Piece Production Lathe,
Model 6WSL, m.d.
No. 3 Lodge & Shipley Duomatic, m.d., late
type

No. 4 LeBlond Boring Lathe, 37' bed, 4" hole,
m.d., latest
No. 9, 12 LeBlond Multi-Cut, m.d.
No. 16 LeBlond Automatic, m.d.
4x60", LoSwing, m.d.
8x132" LoSwing, m.d., latest
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12x18" centers Monarch Model 5T, m.d.
Model U, 14"x24" centers, LoSwing, m.d.
No. 12 Gisholt Semi-Special Automatic Produc-
tion, m.d.
No. 9WSL, Reid Production
17"x39 1/4" LeBlond Mfg. Type Production Lathe
17"x75 1/4" LeBlond, m.d.
No. 10 Sundstrand Automatic Production Lathe,
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No. 12 Sundstrand Automatic Production Lathe,
m.d.
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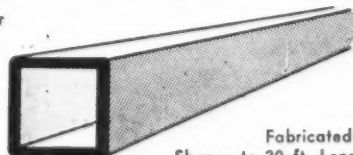
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Scrap Export Ban Lifted

The government showed its awareness of the soft market by lifting its ban on exports of heavy meltin-grades of scrap. Licenses for export of these grades again are being issued by the Dept. of Commerce, following March 26 decision.

It warns, however, that it is keeping a sharp eye on market conditions. Any severe tightening up of the market could result in a revival of prohibition against exports of heavy melting. Shortages abroad contributed to the decision.

Industry Escapes 'Quake Damage

Although San Francisco's earthquake caused millions of dollars in damage, industry escaped completely unscathed. A check of insurance companies, Chamber of Commerce, and public authorities indicated most of the destruction was to homes. The brunt of the shock was in an area where there is practically no industry. Also, one-story construction of most modern plants in the area was credited by officials with keeping damage at a minimum.

Reynolds Gets Jamaica Rights

Reynolds Metals Co. and its subsidiary, Reynolds Jamaica Mines, Ltd., contracted with the government of Jamaica to mine bauxite ore for 99 years. The agreement established bauxite royalties and taxes for 25 years. The company plans to ship at a rate of more than 2 million tons this year. Reynolds has about 60,000 acres of bauxite properties there.

Business Plans Heavy Borrowing

Manufacturing companies and public utilities plan to obtain \$8.4 billion through the securities market or bank loans in 1957, according to a Securities and Exchange Commission survey. This compares with \$7.9 billion last year. Outlays by manufacturers are expected to decline from \$5 billion in 1956 to \$4.2 billion this year. Gain in utilities' spending will account for the overall increase.

Industrial Furnace Orders Drop

February orders for industrial furnaces totaled \$8,373,120, compared with \$12,162,877 for February a year ago. Orders for the first two months of the year are 30 pct less than the same period a year ago. But orders for induction and dielectric heating climbed to \$1,674,331 for the month compared with \$917,953 a year ago, an 82 pct increase.

An asterisk beside the name of advertiser indicates that a booklet, or other information, is offered in the advertisement. Write to the manufacturer for your copies today.

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Tool Steel Topics



On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

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Bearcat Puts the Eye in Eye Bolt ... And Does It Economically

Putting the eye in an eye bolt is one thing, but doing it quickly, accurately and economically on thousands of pieces is something else again. J. H. Williams & Co., Buffalo, who make wrenches, tools and drop-forgings, changed to Bearcat for the punching operation shown here. They found that because of Bearcat's fine wear-resistance and shock-resistance, the punch provided a service life about

50 per cent longer than the one previously used.

The Bearcat punch, hardened to Rockwell C 56-58, works on steel stock $\frac{1}{8}$ in. and $\frac{5}{16}$ in. thick, and knocks out discs approximately $\frac{3}{4}$ in. in diameter. About 0.020 in. to 0.040 in. is removed in occasional redressing.

Bearcat is our super-tough, air-hardening, general-purpose grade of tool steel. It is perhaps best known for its exceptional resistance to shock and wear. Besides, its air-hardening characteristic minimizes quenching hazards, and also provides excellent resistance to distortion in heat-treatment.

Bearcat has a wide range of tough applications, too. In addition to its use in punches, it's a natural for rivet sets, chisels, gripper dies and hot-headers. It is also ideal for master hobs, and for dies used in blanking, bending, and cold-forming.

Your local tool steel distributor has a stock of Bearcat, and chances are good that he can furnish exactly what you need. Call him now, while you have it in mind.



BETHLEHEM TOOL STEEL ENGINEER SAYS:



Choosing the Grade Means More Than Naming the Tool

Let's say you have a general tool-and-die application, for which you are to select the proper grade of tool steel. How do you go about it? Obviously, it is not enough to know that the customer wants high hardness and good wear-resistance, for these properties are always required, in some degree. What you need are the answers to the following questions:

1. How is the tool to be made?
2. How is it to be used? Blanking? Forming? Cutting?
3. How is the steel to be heat-treated?
4. Are machinability and wear-resistance important?
5. How close must size be held after heat-treatment?
6. What is the previous experience with this job? Which steels were used and what results were obtained?

Selecting tool steel grades, even when you want perfection of operation, isn't too hard when sufficient data is available. But without adequate information, you may find your selection is disappointing.



TOOL STEEL MOVIE WINS ANOTHER AWARD

Bethlehem's tool steel color movie, "Teamwork," an award winner at film festivals at Columbus and Chicago, recently won a Certificate of Merit at the Cleveland Film Festival.

The 16-mm, 30-minute picture explains the quality control and heat-treatment of Bethlehem tool steel, and shows typical applications of the carbon, oil- and air-hardening, shock-resisting, hot-work, and high-speed grades.

It's excellent for showing to heat-treaters, die-makers, machinists and machine-tool manufacturers, as well as to technical societies and engineering students. If you would like to schedule a showing of "Teamwork," send your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa.



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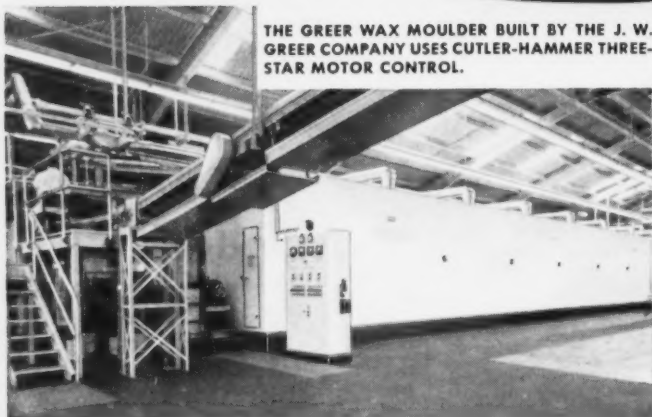
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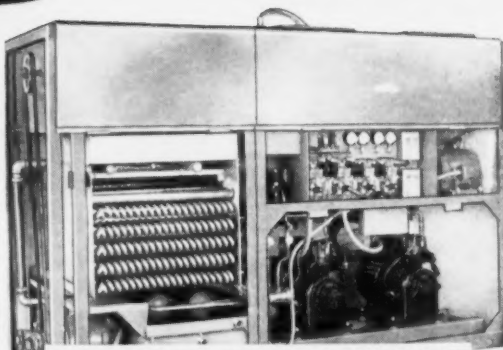
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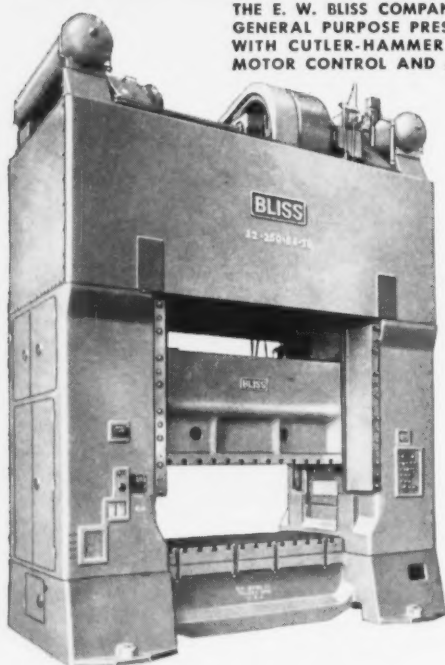
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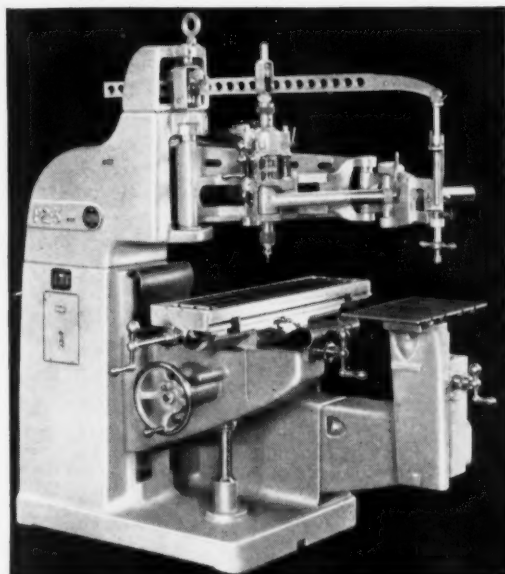
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